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CHINA REPORT
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ABSTRACTS

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SINO-FRG SCIENTIFIC COOPERATION DETAILED

HK Beijing LIAOWANG in Chinese, 24 Feb 86 pp 35-36

[Dispatch from Bonn by special contributors Li Zhongfa [2621 6786 4099] and Wang Aibao [3769 1947 1405]: "A Cooperative Relation Filled with Mutual Trust--FRG Research and Technology Minister of Scientific and Technological Cooperation with China"]

[Excerpts] First the unassuming minister Heinz Riesenhuber gave us a briefing on the general situation in Sino-FRG scientific and technological cooperation.

Sino-FRG scientific and technological cooperation "is still at the stage of infancy, but it grows very quickly." With these words, he summed up the present situation of scientific and technological cooperation between the two countries. In a short period of several years, the FRG has already become one of China's most important partners of scientific and technological cooperation, and China has already become the Third World country that has the most wide-ranging and most quickly developing scientific and technological cooperation with the FRG. Since the governments of the two countries signed a scientific and technological cooperation agreement in October 1978, the scientific and technological cooperation between the two countries has continued to deepen and widen and heartening achievements have been scored. The two sides have already concluded 37 counterpart cooperation agreements between ministries and between scientific research units and agreements on large scientific and technological cooperation projects. The scope of scientific and technological cooperation has been extended from 11 fields including energy, materials, aviation, electronic technology and production technology to 15 fields including nuclear energy and astronautics.

In the geological, metallurgical, nonferrous metals and astronautical fields, the responsible departments of the two sides meet every year to discuss the cooperation projects in their respective fields. In the fields of basic research, aviation, weights and measures, and electronic technology, the counterpart scientific research institutes of the two sides meet periodically to draw up their cooperation plans. The methods of cooperation between the two sides have gradually developed from the previous methods of merely exchanging data and general exchange of inspection visits to the methods of joint research, cooperation in testing, joint prospecting, joint designing, technological consultation, joint academic symposiums, and cooperation in research between the scientific research institutes of the two sides.

Riesenhuber said that the FRG attached very great importance to intensifying its scientific and technological cooperation with China. Over the past few years, the FRG has already provided nearly 50 million Deutsche Marks of funds for 35 cooperation projects. From 1985 to 1986, the FRG provided 1 million Deutsche Marks to fund the exchange of scientific and technological personnel between the two countries. Under the common efforts of the two sides, great successes have been achieved in many cooperation projects, such as the energy redistribution research in Guangdong province, the energy utilization project in Daxing County, Beijing, and the production management modernization in Shenyang First Machine Tools Plant. The two sides have also scored market achievements in their cooperation in the fields of basic researrch, energy, materials and electronic technology.

When he talked about the prospects for the scientific and technological cooperation between the two countries, he smiled and looked full of confidence. He said that China has an almost boundless demand for infrastructure (communications, city and district planning, post and telecommunications, energy supply, waste water processing, and so on), has scored outstanding achievements in many fields of scientific research and has scientists and specialized workers whose ambition and working spirit are worth praising; on the other hand, the FRG has a relatively strong scientific research work force, the technological quality of its industrial products is relatively high, and the FRG industrialist circles are also willing to conduct wide-ranging technological transfer, help China train personnel, and set up joint venture enterprises. This constitutes a firm foundation for the scientific and technological cooperation between the two countries. Therefore, Riesenhuber suggested that the two countries should fully tap the potential of wide-ranging cooperation.

Riesenhuber said that scientific and technological cooperation is now developing in wider spheres with more advanced technology. For example, they have reached agreements or are holding talks concerning the cooperation in the extraction of protein, oceanographic research and technology, environmental research and technology, utilization of nuclear energy to provide heat to cities, electronic technology, and information technology.

When we asked him whether there was any problem in the scientific and technological cooperation between the two countries, with fervor and assurance, Riesenhuber immediately said that there was no problem or trouble in our cooperation. He said that our cooperation was carried out on the basis of a partner relationship and was filled with the spirit of friendship and mutual accomodation and respect. The relationship of mutual trust between the two sides has already been written into the history of the scientific and technological cooperation between the two countries.

Risenhuber is now the youngest minister in FRG government. He graduated from the Frankfurt University, majoring in chemistry. In addition, he is quite accomplished in both national economics and philosophy. In order to better turn scientific research achievements into productive forces, he conscientiously upholds pushing forward the economic cooperation between the two countries through scientific and technological cooperation. He said that Chancellor Helmet Kohl's visit to China in October 1984 and Premier Zhao

Ziyang's visit to the FRG in June 1985 have greatly promoted the economic cooperation between the two countries. Last year alone, the governors of about half of FRG states visited China. A common characteristic of all these visits was that they all promoted economic cooperation between the two countries.

Riesenhuber said that China satisfactorily calls the second phase of the Baoshan Iron and Steel Project as an example of the cooperation between the two countries. He stressed: "We should not think this is enough. We are willing to carry out more projects like Baoshan with China. We will always better carry on Baoshan's cooperative spirit in all other projects including the projects to provide Southern Jiangsu with equipment for a nuclear power station and to provide satellite technology.

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CSO: 4008/2078

HEILONGJIANG INTENSIFIES CIVILIAN-MILITARY COOPERATION

Tianjin JISHU SHICHANG BAO in Chinese 18 Feb 86 p 1

[Article by Wei Zengrun [7614 1073 3387]: "Heilongjiang Stresses Greater Civilian-Military Cooperation During the Seventh 5-Year Plan"]

[Text] Heilongjiang's defense science and technology sector has conscientiously carried out the work related to the development of civilian products, technology transfer, and technological advice and consultation. During the Sixth 5-Year Plan, it produced more than 40 civilian products, of which 10 have become key civilian products, including bicycles (made of aluminium alloy), industrial sewing machines, steel tanks for liquidized petroleum gas, light automobiles, washing machines, light automobiles, high pressure gas cylinders (made of steel or aluminium), engines for light automobiles, shaped copper and shaped aluminium. Capacity for the production of these products has already taken shape and great economic results have been achieved.

In order to give full play to the advantages and tap the potential of its defense industry, Heilongjiang's defense industrial sector has put forth a magnificent plan during the Seventh 5-Year Plan. The sector will yield more than 3.5 billion yuan of civilian output value and develop 10 more key civilian products, such as plastic products, machinery for making plastic products, tools for making plastic goods, heavy automobiles and their variations, levelling machines, elevators, motor cycles, beer, oil rigs, and precision hard metal alloys. It will also conscientiously carry out the work of transferring military technology to civilian production, and has already sorted out about 1,000 kinds of technology that can be transfered to civilian production. It has formulated a "spark plan" to jointly carry out "short-term, level and speedy" projects, such as gold exploitation and the fixing and manufacturing of gold exploitation equipment. In addition, it will intensify lateral cooperation, conduct specialized coordination, and give full play to the role of the various kinds of specialists in its defense industrial colleges and universities and scientific research units. At the request of its customers, it will provide designing service for new projects, technological transformation projects and special equipment, help tackle technological hurdles, provide technological advice, and train personnel. Heilongjiang Province's national defense industry will intensify its efforts and strive to reinvigorate China during the Seventh 5-Year Plan.

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SONG JIAN URGES SCIENTISTS, TECHNICIANS TO STUDY LAW

Tianjin JISHU SHICHANG BAO in Chinese 11 Feb 86 p 1

[Article by Zhu Qingfang [2612 1987 5364]: "Song Jian, Minister in charge of the State Science and technology Commission, Calls on Scientific and Technological Circles to Study Law"]

[Text] At the recent work conference of the State Science and Technology Commission, Song Jian, minister in charge, called on all the workers of the commission and in the scientific and technological field to study law conscientiously in the course of strengthening the construction of our spiritual civilization and to become models in observing the law.

Song Jian said that our party's goal is to build a modern socialist country with highly developed civilization and democracy. Law is an important constituent part of modern civilization and also an important symbol of high level of democracy. Last year, the CPC Central Committee decided that in 1986 we should popularize knowledge of law on a national scale, every citizen should study this knowledge, and leading cadres should study even better. Ours is a big country with 1 billion people and hundreds and thousands of lines of trade. Without regulations, rules or laws to govern our work, there will be no guarantee for the interests of our people and state. Therefore, we all should happily accept the restrictions of laws; otherwise, it will be impossible for civilization or democracy to exist. Song Jian also explained the meaning of freedom. He said that freedom meant the right to do all the things allowed by the law. If one does a thing forbidden by our law, he will no longer have freedom because he has harmed the interests of the people and state. In his speech, Song Jian also stressed that one of the important reasons for some of the problems that have cropped up in our scientific and technological circles at present is that some people do not understand, attach importance to or observe law. The leading groups at all levels must pay close attention to this. Song Jian called on all the comrades in our scientific and technological circles to study, become familiar with, and observe our law. We should make everyone understand what he is allowed to do and what he is not. All scientific research institutes should set examples in observing our law. All independent science and technology institutions should employ full-time lawyers and have experts specialized in law to help their work. This should become a set practice and a habit. They should by no means do anything against the law, otherwise, their fine words about science and technology will become useless in the face of law.

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FUND ALLOCATION FOR SHANGHAI'S SPARK PLAN REPORTED

Shanghai JIEFANG RIBAO in Chinese 6 Dec 85 p 1

[Text] Shanghai's "Spark Plan" has already been drawn up. For the period of the Seventh 5-Year Plan, the Municipal Committee on Science and Technology is prepared to take 7,000,000 yuan annually from the three Science and Technology funding lines to implement "The Spark Plan" for the purpose of implanting a new science and technology embryo in order to develop the local economy. The "Spark Plan" is an important national scientific and technological task for the period of the Seventh 5-Year Plan. Its purpose is to combine scientific and technological work even more closely with the economy to raise the scientific and technological level of medium and small enterprises, township and town enterprises, and agricultural village construction, thereby developing the local economy. On the basis of Shanghai's lack of resources, and on the practical situation of its having a certain superiority in technology and talent, the Municipal Party Committee on Science and Technology has, besides submitting the 22 topics in the "Spark Plan," recently drawn up a "Spark Plan" for the Shanghai Municipality for 1986 to 1987. Arrangements have been made for the first batch to include 12 topics: napped cloth, feed solid dry yeast, mustard acid, fast growing cypress, emulsified essences, Chinese medicinal tonic drinks, solar panels, handicraft hats, [diethyl poly para phenylene], [succinic acid ester fibers], glass wool blankets, GC high-speed sewing machines, and graft paper pulp. All of these topics provide significant economic benefit. It is estimated that annual production will increase by 118,390,000 yuan, taxes by 32,010,000 yuan, and 19,590,000 yuan in foreign exchange will be conserved or set up. The total to go into production will be approximately 21,380,000 yuan. Its emphasis is on serving export and earning foreign exchange, actively supporting as well as organizing and arranging the conversion into export commodities of a batch of scientific and technological accomplishments, simultaneously arranging a batch of topics to save foreign exchange, reducing or ceasing the import of raw materials, parts, or equipment; developing or furnishing technology for medium and small enterprises as well as townships and towns, organizing digestion, absorption, and production for equipment in high demand or in fixed quantities, to fulfill the developmental requirements of medium and small enterprises as well as township and town enterprises; to develop the resources of the suburban counties of Shanghai and develop vigorously economic services for the suburban counties, to emphasize the arranging of developmental projects directly related to the daily lives of the people of Shanghai such as vegetables, fish, eggs, domestic animals, etc.; and to serve such projects as providing complete sets of equipment for industries or providing small commodities with innovations for the marketplace.

EFFECTS OF TECHNOLOGY IMPORTATION DISCUSSED

Tianjin KEXUEXUE YU KEXUE JISHU GUANLI [SCIENCE OF SCIENCE AND MANAGEMENT OF S&T] in Chinese No 2, 1986 pp 8-9

[Article by Li Yunshu [2621 6663 5289], Baotou City Institute of Scientific and Technical Information; Wan Li [8001 0500], responsible editor: "The Effects of Importation of Technology on Science and Technology and Economic Development"]

[Text] With the continued thorough implementation of our open-door policy, the effects of using foreign funds and imported technology in the development of science and technology and in the economy is becoming greater and more and more obvious. Therefore, many provinces and cities in China wish to use foreign funds and import even more technology to accelerate the development of local science and technology and the economy. In 1984, after Baotou was listed as one of the larger cities in China, a means was established in the Shenzhen special economic zone for the importation of technology through an investment by local financing of 1 million yuan. Basing this paper on the situation regarding the effects of importing technology in the Shenzhen special economic zone on science and technology and economic development, I mention some of the problems that should be considered when importing technology.

I. Technology is a commodity, so importing technology is a form of technology trade. What I mean by technology trade is similar to the international licensing trade, that is, a transfer at a price of the rights to technology. The matter of transfer of the rights to technology may be divided into patents, technology secrets, and trademarks. Since technology trade is a kind of trade, many trade-related questions must be studied, as for example trade policies, trade conditions and means, and ordering methods. But at the same time it is a means for the transfer of rights to technology, and therefore there are also many technical questions to be considered, as for example the selection of items and analysis of the degrees of advancement and of the economy, the technology to be imported and the technical conditions in the importing country, and methods of implementation and results of applications, as well as absorption and improvement after importation. People in relevant international societies have pointed out that technology trade concerns the various aspects of technology, economy, law, operations, and management, and that the process itself of transforming the technical knowledge of one country

into actual production in another country is a complicated technology and branch of learning.

Because of the increasingly important decisive function of science and technology in development of the economy, the development of technology trade might be even more apparent than the development of trade for any one commodity. The substance of technology trade is international specialization in scientific and technical research, and is also the direct result of scientific and technical advances because the large scale investment needed for even higher level scientific and technical research often exceeds the capacity of a nation or firm. Which brings about international specialization in science and technology research. This international specialization in scientific and technical research is the most essential characteristic in future international sharing of labor. Trade in patent rights and licensing is a result of this division of labor.

After the second world war, scientific and technical development was extremely rapid. Consequently, the development of technology trade has been extremely rapid, and has become as well an important form of international trade. According to United Nations statistics, 1985 volumes for world technology trade could reach $40-50 billion dollars. In the past, technology trade was centered in developed countries, and especially in the United States, England, France, Japan, and West Germany, but in recent years a small number of developing countries, as for example India, Argentina, and China, have also begun shipping technology out, even exporting entire sets of equipment.

II. In 1979, China decided to establish a special economic zone in the city of Shenzhen, important goals for which were to use foreign investment, import advanced technology and management methods, and allow the special economic zones to build toward rapid development, and also to serve the "drive toward modernization" and to allow it to become for the whole country "a window of technology, a window of knowledge, a window of management, and a window for an open-door policy." Since establishment of the Shenzhen special economic zone, importation of technology has developed rapidly, and from 1979 through 1983 there were 2,282 agreements signed with customers from more than 10 nations and regions regarding industry, commerce, agriculture, real estate, transportation and shipping, and travel, as well as with other businesses. Actual foreign investment has been $2,316,880,000 [Hong Kong dollars]. There were 22 projects involving $100 million [Hong Kong dollars] or more among them, and 63 that involved $10 million [Hong Kong dollars] or more.

Looking at this from the point of view of investment by business: industry has the most, 1,718 projects in all, with an actual investment of $1,053,520,000 [Hong Kong dollars]; commerce had 81 projects, for an actual investment of $119.23 million [Hong Kong dollars]; 375 projects in agriculture, for an actual investment of $132.07 million [Hong Kong dollars]; 58 real estate projects, for an actual investment of $664.26 million [Hong Kong dollars]; 18 transportation and shipping projects, for an actual investment of $26.93 million [Hong Kong dollars]; 13 projects in tourism, for an actual investment of $123.42 million [Hong Kong dollars]; 19 projects in other businesses, with an actual investment of $197.45 million [Hong Kong dollars].

Looking at modes of investment: 76 projects were jointly funded and operated, for an actual investment of $236.56 million [Hong Kong dollars]; 211 were cooperatively managed, for an actual investment of $1.26630 billion [Hong Kong dollars]; 37 were independently funded and operated, for an actual investment of $298.64 [Hong Kong dollars]; 5 were for compensation trade, for an actual investment of $9.160 million [Hong Kong dollars]; and there were 1,953 projects for processing and assembly and for processing of imported materials, for an actual investment of $506.22 million [Hong Kong dollars].

Importation of technology in Shenzhen went through a process by which it developed from a low-grade form to a high-grade form, that is, a process by which it developed from processing and assembly and processing of imported materials to compensation trade, and even joint funding and operation, to form advanced, intermediate, and still backward hierarchical technology and industrial structure. With the development of the special economic zones and constant perfection of base structures, there will be importation of even more advanced technology, and labor intensive enterprises will develop toward capital intensive and technology intensive enterprises.

For 4 years now, the Shenzhen economic zone has absorbed foreign investment and imported advanced technology and equipment, which has not only accelerated advances in science and technology, but has also promoted economic development, and has brought about an enormous improvement in the lives of the people. The gross industrial output value from Shenzhen in 1982 reached 359 million yuan, a nearly fivefold increase over 1978 and an average annual growth of nearly 100 percent; per capita annual industrial labor productivity was 177 million yuan, a growth more than double that of 1978. For agriculture throughout the city in 1982, per capita allocation was 393 yuan, 2.9 times that of 1978, and of 238 agricultural brigades throughout the city 9 had per capita allocations of 1,000 yuan and up. More than 2,300 households had total incomes of over 10,000 yuan. Tax revenue in the city of Shenzhen in 1982 was 163 million yuan, a growth of 25.4 percent over 1981. In 1982 more than 15,000 people found employment, and 400,000 sq m of new housing area was built. Current per capita living area is 9.6 sq m which is rather spacious among cities throughout the country.

III. The situation regarding the importation of technology in the Shenzhen special economic zone shows that the effects on science and technology and on economic development of the importation of technology have truly been enormous, and that it has served to promote science and technology and economic development has been quite obvious. Use of foreign investment, the importation of technology, and expansion of foreign trade are important matters in China's open-door policy. Our open-door policy is a long-term strategic principle, and therefore the importation of technology is also a long-term strategic principle for China. It has been of important strategic significance for the conservation of manpower, material power, and financial power, for winning time and exploiting international markets, for promoting advances in science and technology and in economic development, for realizing the strategic goals of quadrupling gross output value, for accomplishing the great mission of the "four modernizations," and for improving the people's standard of living.

To further the work in importing technology and to accelerate the development of the economy in this country, I believe that we should concentrate on solving the following few problems:

1. Improve ideological understanding. We should overcome the effects of "leftist" thinking and raise the importation of technology to a high degree of understanding as being a long term strategic policy of this country, and we should include this effort as an important item on the agenda for party committees and governments at all levels. It should become a focus, for which leadership should be strengthened.

2. Open up more. After China established 4 special economic zones, we also resolved to open up 14 coastal cities, which was a deepening and expansion of our open door policy. But in some provinces and cities in the interior, and especially some of the border regions, the tendency to keep things locked up has not yet changed, and success at opening up has been insufficient. On the heels of our four special economic zones and the 14 opened coastal cities, we should move to open up the largest and larger cities in this country and should formulate some preferential and flexible policies and appropriately expand their authority to more effectively attract foreign investment and import technology; at the same time, we should fully use the windows that are the special economic zones and the opened coastal cities to import from abroad while uniting within and enhance lateral relations to allow the importation and absorption of the technologies in these regions to move as quickly as possible toward cities in the inland. In general, we should change from an "inward" economy to an "outward" economy, which would allow the advanced technologies of our eastern coastal regions to unite with the abundant resources of the inland areas, for mutual promotion and the exploitation of advantages.

3. The importation of technology touches both upon the economic system and the science and technology system, and if we are to do this work well then we should arouse the enthusiasm of departments of industry, science and technology, and foreign trade, and especially the close cooperation between units of economics and science and technology commissions and offices of foreign trade, to thoroughly achieve industrial and trade integration and the integration of technology with trade.

4. In the past, there have been errors in the areas of the importation of technology and equipment. Chiefly, these have been the excessive importation of entire sets of equipment, duplicate importation, and too little concern for the importation of advanced technologies, nor have these things been well absorbed or assimilated. From now on, we ought to primarily import technology and import only that key equipment that China cannot manufacture. We should not import whole sets of equipment, we should not import things in duplicate, and we should not import things that cannot then be assimilated and disseminated. Importing technology should serve the technical transformation of current enterprises. The forms of importing should less often be assembly of imported components and processing of imported materials, but should be more often in the forms of joint funding and operations, cooperative management, or compensation trade. At the same time as we develop basic industries, we should pay attention to developing capital intensive and

technology intensive enterprises; at the same time as we focus on the development of industry, we should pay attention to the corresponding development of commerce, transportation and shipping, real estate, travel, and agriculture, animal husbandry, and fishing.

5. Enhance work in science and technology information and economic information, do a good job at selection and justification of import projects, collect and analyze information on advanced technology, market pricing, and imported technology, work toward making information available, toward dealing with it in a timely manner, and being familiar with it, and avoid blind importation, being cheated, and committing errors.

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CONFERENCE ON USING FOREIGN FUNDS TO IMPORT TECHNOLOGY

Tianjin TIANJIN RIBAO in Chinese 7 Nov 85 p 2

[Text] Yesterday the Municipal Government convened a conference to exchange experience in the use of foreign funds by our city's scientific research units in the introduction of technology. The Paper Manufacturing Research Institute, the Textile Industry Research Institute, the Computation Center, the New Technology Development Corporation, and the Tianjin Great Northern Ocean Development Service Corporation made presentations on their experience. Yang Jingheng [2799 4552 5899] of the Standing Committee of the Municipal Party Committee and Li Lanqing [2621 1526 3237], the Deputy Mayor, both delivered remarks.

During his remarks, Li Lanqing stated that, while being more open outwardly, scientific research units should combine their own scientific research achievements with imported advanced technology and devote effort toward digestion, absorption, and innovation. He pointed out that the sphere for scientific research departments to use foreign funds to import technology is very expansive. For example, they could cooperate with foreign scientific research units, universities, and corporations to exchange and disseminate scientific research information and advice, develop new products and technology, transfer technology, develop and transfer software, contract for engineering design, and train and furnish talent to set up joint ventures with production enterprises and foreign businessmen and to help them digest, absorb and raise the level of imported technology and so on. He also clarified channels and methods for the scientific research departments, hoping that all concerned would set records in this area.

Yang Jingheng stated in his remarks that scientific research units should continue to the transformation, from inwardly oriented to outwardly oriented, scientifically researching how to change forms; creating multiple forms; developing channels for foreign trade in science and technology and for joint funding and cooperation; to deal precisely with the relationship between internal development and the importation of technology; to stress economic benefit in all commercial science and technology and exchange activity; to

deal correctly with the problem of opening outward and the security of technology; and that a group of science and technology troops be cultivated who have the knowledge, understanding of foreign languages, adeptness in negotiation, and the ability to develop foreign trade activity.

Deputy Mayor Yao Jun [1202 1498] also attended the conference.

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STRONGER CONTROL OF TECHNOLOGY MARKETS DISCUSSED

Beijing GUANGMING RIBAO in Chinese 5 Dec 85 p 1

[Article by Zheng Haining [6774 3189 1380]: "Strengthen Control over Technology Markets to Promote Healthy Development"]

[Text] On 12 December a responsible person from the State Science and Technology Commission gave a talk to reporters on the situation facing our country's technology market as well as how to further control the technology market, promoting the health and development of the technology market, and other questions.

This responsible person stated that a new situation of vigorous growth appeared in our country's technology market this year, which strongly promoted the transfer of technology and the spreading of the application of technological achievements to production. Recently, however, a problem was discovered which deserves attention: interference with the normal development of the technology market. At present we must adhere firmly to the direction of restructuring, further opening technology markets and continuing to implement the guidance: "Open, vitalize, foster, guide," ensuring the healthy development of the restructuring of the scientific and technological system.

He pointed out that all areas and all departments must earnestly strengthen the leadership of the technology market, establishing and strengthening essential management control systems. Technology markets may take many forms and uniformity should not be forced; participation in interchange activity should be voluntary and not forcibly ordered; it should be discussed in terms of practical effect rather than formalism. Technology transferred in the technology market should be mature technology or a phased technological achievement, with the transferer explaining the level of maturity of the technological achievement realistically, not exaggerating, and not resorting to deception; plagiarizing of others' achievements and encroaching upon others' economic rights are forbidden, as is the transferral of technology in violation of national law or policy requirements. In the case of technology which must be safeguarded because of national security or major economic benefit, transferral should be handlled in accordance with national regulations pertaining to the security of science and technology.

He emphasized that, when trading in technology, both seller and buyer must, on the basis of a serious, earnest, and responsible attitude, furnish the pertinent details of the situation to the other party in practical fashion, and on the basis of the concurrence of both parties, sign and abide by the technological contract prepared in accordance with pertinent regulations. Besides having the pertinent technical content, the contract must clearly specify the rate of progress of the work; the expense budget; the rights and responsibilities of buyer, seller, and intermediary; price or remuneration; the method of payment; test and acceptance standards and methods; the ownership and enjoyment of technological achievements; responsibility for violations of the agreement and so on. The economic ability of the recipient to support technology should be given adequate consideration in setting the price of technological commodities. All income from technology transfers should be tax exempt in the near term, and a portion taken to reward personnel directly engaged in the developmental work, with funds for the awards excluded from the unit's budget for incentive awards. During a fixed time limit, new products should enjoy the benefit of reduced taxes.

He finally pointed out that, on the premise of completing their assigned work and nonencroachment upon the unit's technological rights and economic benefit, scientific and technological personnel may conduct appropriate technological work and consultant services in their spare time, retaining the income from such activity; and, when the unit's technological accomplishments and internal technological information and equipment are utilized, concurrence of the unit is required, and a portion of the income turned in to higher authority. Salaries, treatment, and technical duties of scientific and technological personnel working in management agencies related to the technological market and other scientific and technological personnel engaged in technological management activity should be treated equally without discrimination.

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ADVANCES IN HUNAN, GUANGDONG, SHANGHAI TECHNOLOGY MARKETS

Beijing GUANGMING RIBAO in Chinese 6 Dec 85 p 1

[Text] Seven units including the State Science and Technology Commission, the National Defense Science, Technology and Industry Commission, the State Education Commission, and the State Statistical Bureau, recently indicated clearly regarding the investigation of the situation of the technology markets of Hunan Province, Guangdong Province and the Shanghai Municipality that our country's technology markets have already manifested a lively new situation, and constitute a bridge from science and technology to the economy.

Since the promulgation of the Central Committee's decision to restructure the science and technology system, many levels, many channels, and many forms of technology exchange in Hunan Province, Guangdong Province, and the Shanghai Municipality have made unprecedented leaps forward. Based on incomplete statistics, over 850 first-level technology exchange structures have appeared in these areas. Various types of joint ventures and integrated bodies formed by providing technology as a share have been springing up vigorously, with more than 460 in Hunan Province alone. Technology development service agencies in many prefectures have formed networks, individually becoming strong front armies, and also exhibiting a competitive aspects. In addition, some prefectures have sponsored technological and economic talks and exchange activity in Hong Kong as well as abroad, importing foreign capital and technology, promoting technological development and technological reform. Foshan, for example, by taking advantage of its many compatriots from Hong Kong and Macao and its many overseas relatives, sponsored talks in Hong Kong on the introduction of technology and economic cooperation, signing up to $500 million dollars in contracts and letters of intent with overseas Chinese and foreign businessmen.

Since the opening of the technology market, practice has shown that the technology market has efficiently promoted the development and flourishing of city and township economies, and also brought life and vitality to scientific and technological work itself. The Changsha City Science and Technology Development Center, for example, actively participated in attacking difficult technical problems, technical consultation and other technology exchange activity directed toward medium- and small-scale enterprises as well as township and town enterprises. That center organized four instructors who in 1 1/2 years completed the major technical task of an aluminum and magnesium

alloy for a luminescent substance for Liuyang's fireworks, making fireworks the premier industry of Liuyang county with annual production over 100 million yuan. The opening of technology markets also brought life to scientific research units. According to statistics of the 45 higher institutes in the Shanghai Municipality, since the opening of the technology market, technical income of these higher institutes has increased from the 7 million yuan of 1982 to 30 million yuan in 1984 and to 3.6 million yuan for the first half of 1985. The opening of the technology market has expedited the progress of the transformation of scientific research achievements into production capacity. In the Shanghai Municipality before the technology market had been formed, for example, the transfer ratio of scientific research achievements was only 20 to 30 percent, while of the 1,585 achievements in the 1984 statistics of that municipality's Economic Committee, 834 had been transferred.

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TIANJIN'S EXPERIENCE IN TECHNOLOGY IMPORT WORK

Tianjin JISHU SHICHANG BAO in Chinese 11 Feb 86 p 1

[Report by Ma Junxin [7456 0193 9515]: "Tianjin's Experience: the Way to Do a More Thorough Job in Technology Input Work Is to Concentrate on Developing Enterprises' Capability for Redevelopment"]

[Text] Since last year, while concentrating on putting technology import projects into operation, the Tianjin Economic Committee has paid close attention to grasping the work of digesting, assimilating and further developing the imported technology. Currently, more than 30 of Tianjin's enterprises with imported technology have acquired the capability to redevelop their products, equipment and technology. The city has thus opened a new path for assimilating and importing technology.

Since 1983, Tianjin has signed a total of 684 contracts with foreigners worth US$612.88 million. Last year, it focused on actually putting imported technology projects into operation. It put 202 projects into production that very year to produce 473 new varieties of products, of which 89 were exported to earn US$40 million.

In the process of importing technology, Tianjin has paid particular attention to developing its enterprises' capability for redevelopment, and thus turned more than 30 of its enterprises with imported technology into bases for the development of new technology. Tianjin's Jinhua Radio Factory is a factory specialized in producing audio recorders. In the past, it could only assemble imported foreign components, but over the past few years, as it has clarified the orientation of its technological transformation, it has imported tehcnology from abroad and gradually acquired a capability to redevelop their products. It has conducted joint ventures with medium-sized and small Japanese enterprises to develop new products, to draw help from foreign technology, and make full use of its own equipment. As a result, it can develop and put into production 3 to 5 new varieties of products a year and thus made it possible for our country to update its production of audio recorders. At present, the factory can put 5 percent of its products on the international market. Some factories have acquired the capacity to develop advanced equipment. For example, the Electroacoustic Equipment Plant which has produced loudspeakers for many years, has jointly designed, together with a Japanese factory specialized in producing equipment, a high-level production line that meets our national conditions. It has very quickly become able to

independently produce this production line and can now provide equipment for similar factories in our country. Many factories have acquired the capacity to transfer technology on the basis of importing, assimilating and redeveloping technology. Some of them have sold their products in various countries in the world and achieved marked economic results.

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STEADY GROWTH OF TIANJIN'S RESEARCH INSTITUTIONS DISCUSSED

Tianjing JISHU SHICHANG BAO in Chinese 18 Feb 86 p 1

[Article: "Through consolidation, reform and lateral cooperation, Tianjin's Scientific Research Institutions Develop Steadily"]

[Text] During the Sixth Five-Year Plan, Tianjin steadily developed its scientific research institutions and made contributions to the invigoration of its economy.

First, a comprehensive consolidation was carried out in all the 92 research institutes in the city. By the end of last June, all of them had been checked and accepted by the state. These institutes won 35 State Invention Awards, of which 15 were won by the research projects of specialized research institutes. Currently, 15 of the research institutes are conducting joint ventures of development and research with foreigners. Eighteen of the institutes have become technoloigcal development or measuring and testing centers for the city, north China, or the nation as a whole, and four of them already have the approval of the State Council to become state-level product quality checking and testing centers.

At present, 26 research institutes have begun to carry out reform one after another and have scored marked achievements. The net income over the past 2 years reached 31 million yuan and the allocation of funds for these institutes was reduced by 3.03 million yuan. Last year, six research institutes became self-supported. Moreover, Tianjin already has over 110 joint scientific research, education and production entities, of which 8 joint scientific research and production entities in light, electronic, chemical, and textile industries alone add over 50 million yuan to Tianjin's output value and over 10 million yuan to its tax payments and profits a year.

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CHONGQING'S THRIVING TECHNOLOGY MARKET DESCRIBED

Beijing RENMIN RIBAO in Chinese 3 Mar 86 p 3

[Report Huang Wenfu [7806 2429 4395]: "Technology market unprecedentedly thriving in Chongqing City"]

[Text] At present, there are already 167 organizations working to open up the technology market in Chongqing. They are scattered in the city, districts, counties and some enterprises and institutions and form an open technology market network with diverse levels and wide and deep connections. Last year, the city held and participated in 35 large-scale technological achievements exchange and trade fairs and concluded some 1,100 contracts of technology transfer worth over 85 million yuan.

As far back as in 1979, Chongqing began to carry out compensatory transfer of technological achievements on a trial basis. During the experimental reform of the science and technology system, the city regarded opening a technology market and turning technological achievements into commodities as a key link. It paid attention to widely developing a technological market in diverse, flexible forms. For example, it held city-wide technological achievements trade fairs, organized urban units to go to the countryside and market technology in rural fairs, allowed its scientific research units to open their doors widely and set up technology markets on their own, set up technological cooperation networks among its enterprises, set up joint scientific research and production associations to facilitate technology transfer and organized the export of technological achievements. By so doing, it has organically combined the scattered scientific research forces and the scientific and technological achievements of various scientific research units and initially formed a technology market system that is geared to the needs of society, production and enterprises. Some of these technology markets are permanent, but others are not. Some of them are run by the scientific, technological and economic responsible departments, but others are run by scientific research units and factories and mines on their own. As a result, the initiative of both parties have been brought into play. Last year, the Chongqing Industrial Automation Instrument Institute and the Chongqing Instrument Materials Institute held a technology achievements trade fair on their own, and signed 19 letters of intent and 8 contracts. At the Sino-U.S. joint symposium on transferring technology to productin that was held in the U.S. last October, the Chongqing Industrial Automation Instrument Institute briefed the participants on the technology market that the two institutes had held and roused great interest among American business circles.

In opening up a technology market, we have linked the economic interests of our scientific research units with those of our production units and thus given rise to a thriving situation whereby our scientific units take the initiative both to start research projects in the light of the needs of our production and to transfer science and technology to production units. According to the statistics on the seven scientific research institutes in which the technology contract system has been implemented, last year, these institutes undertook 154 research projects, a 3-fold increase compared to 1983 when the reform had not yet begun, and earned a net income of over 3.6 million yuan, a sum that was 27.5 percent bigger than the annual funds allocated by the state. They have also set up 30 joint scientific research and prodcution associations with production units. In these associations, those who want a project researched provide the funds, and those who purchase the results pay the expenses. This has facilitated the socialization of scientific and technological work and the commercialization of technological achievements. As planned channels are combined with market channels in the work of transferring technological achievements, the rate of application of Chongqing's technological achievements has exceeded 81 percent, setting a new record.

Since the beginning of the opening of technological markets and the transfer of technological achievements, a large number of scientific and technical workers have correspondingly gone to production units to apply technology to production. This has been a rational movement of intellectual resources. In addition, 265 large and medium-sized enterprises and institutions in Chongqing have set up technological cooperation groups among their staff and workers in order to transfer technology, tackle technological problems and provide technological service.

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ANHUI'S S&T SUCCESSES DURING 6TH 5-YEAR PLAN REPORTED

Hefei ANHUI RIBAO in Chinese 25 Dec 85 p 1

[Article by Tang Shengru [0781 4141 1172]: "Numerous S&T Successes in Anhui During Sixth 5-Year Plan Resulting in 1,800 Accomplishments and 1 Billion Yuan in Extra Profit"]

[Text] During the Sixth 5-Year Plan, the technical personnel in Anhui faced economic construction in courageous exploration to overcome difficulties and achieved significant accomplishments.

During the period, Anhui had close to 1,800 S&T accomplishments which is 1.5 times of that in the fifth 5-Year Plan. In 1985, 653 projects were completed which is 2.4 times that in 1981. Many accomplishments are at an advanced level in China and some may even reach the world standard. Based on statistics, among S&T accomplishments achieved in 1981 through 1983, more than 200 items received Chinese national invention awards or S&T accomplishment awards at the provincial or ministerial level. In 1985, 14 items received the Chinese national S&T progress award. These are signs that scientific research standards in Anhui is improving.

Recently, every research institution is more aware of the fact that we must face economic construction, and is more closely linked to economic construction. Various types of joint ventures between scientific research and production are vigorously developing. Under the premise that Government assigned projects are guaranteed to be completed, the majority of research institutions, to the extent possible, is adding lateral topics and self-chosen subjects to serve small and medium township and town enterprises. Based on bidding requirements stated by an industry, Anhui Institute of Optoelectronics spent merely 1 year and 2 months to finish the development of the Model CHY-B rubber sheet thickness gauge. After being tried out by Anhui Rubber Tire Plant, it was found to be able to conserve 10,000 kg of rubber per year. If a feedback control is added, then the amount of material cost saved can reach more than 1 million yuan. In the meantime, because of improved quality and reduced weight of tires manufactured, the social benefit created is more substantial. Various types of entities combining scientific research and production began to emerge in the Sixth 5-Year Plan. There are 436 such entities resulting in significant economic gains. Hefei has 40 combined entities which completed over 200 high standard projects and generated an additional income of approximately 200 million yuan for the city.

During the Sixth 5-Year Plan, in order to open channels for technical accomplishments to go into production, various scientific commissions and scientific associations held nearly 400 technology trade shows. Nine permanent technical markets have been established. There are more than 240 technical consulting and service organizations. The transfer and application of technical accomplishments is accelerated in order to produce a huge economic benefit. Based on incomplete statistics over the period 1981 through 1985, S&T generated 1 billion yuan in economic gains.

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HEBEI'S RESEARCH INSTITUTES SCORED 'PLEASING' RESULTS IN 1985

Shijiazhuang HEBEI RIBAO in Chinese 13 Feb 86 p 4

[Text] In 1985, the provincial Academy of Sciences scored its best results ever.

In 1985, the Academy undertook a total of 131 research projects, an increase of 52 percent over 1984, and finished 47 projects which have passed acceptence checks, an increase of 36 percent over 1984. Among the 47 projects, 15 were of national advanced levels. The Academy has created 30 million yuan of economic results directly for the society, an increase of 110 percent and earned 1.41 million yuan of income in all. It has thus set new records in terms of number and level of projects and in terms of economic results.

The Academy's scientific research work has the following three major characteristics: 1) The number of "short-term, level, and speedy" projects needed for Hebei's economic construction increased compared with any year in the past. Of the 131 research projects, 80 percent are projects related to the development of new technology or products, and 63 percent are planned to be completed within 2 years. The number of the projects started and finished in the year was 13, an increase of 120 percent compared with 1984. 2) The level of the projects was further raised. Last year, the Academy undertook seven state-level research projects, four projects involving major hurdles for the province, and more projects that had a greater influence than in 1984. The project carried out the [Hebei] Institute of Microbiology on enzyme boxes of glucose oxidase has been included in the list of the state's first-grade "spark plan" projects. The joint project between the [Hebei] Institute of Geography and the Institute of Environment Chemistry of the Chinese Academy of Sciences entitled "Prevention of and Policy to Counter Water Pollution in the Beijing-Tianjin Area" is a key state project to be tackled. The Energy Institute's portable tourist sun-energy stove is not only advanced nationally, but has also entered the international market. 3) It has continued to popularize its existing research achievements which originally yielded high economic results. At the same time, it has carried out a number of software scientific research projects which have played an important role in production service. For example, the Mathematics Institute successfully developed software for Xingtai Pharmaceutical Factory to control its production of terramycin chloride. As a result, the factory switched from suffering a per ton loss of over 10,000 yuan to earning a per ton profit of 3,000 yuan, enabling the factory to turn its losses into profits.

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HEBEI'S SUCCESS IN USING S&T TO AID POOR REPORTED

Shijiazhuang HEBEI RIBAO in Chinese 28 Dec 85 p 1

[Text] In recent years, all S&T management departments in Hebei has been emphasizing the use of science and technology to aid the poor. Several measures have been taken to provide services in technology, talent and information. Significant results have been obtained in helping people prosper by developing local resources.

Provide a series of matching applicable advanced technology for regional development. Since 1982, the Scientific Commission of Hebei organized large scale efforts to comprehensively develop S&T in regions such as Taixingshan, Yanshan, Bashang and Helonggang. In Taixingshan, based on local resources, we chose to initially start from fruit and livestock and poultry and then to continue to other levels of rural business. We dedicated our effort to the development of production techniques in high level processing of agricultural products and by-products, comprehensive utilization of resources, storage for freshness, and mining. Based on statistics, there are 37,550,000 fruit trees already under scientific control. Over 18,540,000 head of livestock and poultry have been raised. More than 20,000 processing points were established. Over 60 model S&T industries were built. More than 20 technical accomplishments resulted from a series of complete technology. It was expanded to more than two-thirds of the villages in Taixingshan. The development work in Helonggang consisted of over 20 topics including farming on dry fields, fruits, livestock and processing. The work resulted in the promotion and application of 36 sets of applicable technology. Progress was also made in the development of dry fruits in Yanshan as well as flax, potatoes and livestock in Bashang.

Widely organize technical personnel to teach technology and train people. In recent years, more than 5,000 technical personnel from over 100 research institutions and universities participated the S&T effort. Various levels of technical management departments also retained over 3,000 technical people from Hebei, Beijing, Tianjin and other regions to offer technical consultation and to form service teams to teach technology and train people. Based on statistics, several thousand practical technical items were taught and over 1,000 new products were developed. More than 8,000 sessions of training were offered at various levels on different subjects. More than 120,000,000 people attended those sessions. Over 200 S&T model villages were built and 50,000 S&T model families were trained.

Open the technical market and spread S&T economic information. Since October 1984, information wagons of Hebei Institute of S&T Information have been covering remote areas in the field. They entertained over 200,000 poor people, spread 10,000 pieces of information, held over 30 lectures, and showed S&T videos for more than 200 times. In order to further aid poor areas to change their images, the institute recently established a long term cooperation relation with three counties including Fengning to provide applicable advanced technology.

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HUNAN SUCCESSFULLY POPULARIZES S&T ACHIEVEMENTS

Tianjin JISHU SHICHANG BAO in Chinese 18 Feb 86 p 1

[Article: "Hunan Successfully Popularizes Achievements of Scientific Research Science and Technology"]

[Text] During the Sixth Five-Year Plan, Hunan Province scored marked achievements in popularizing achievements of scientific research and science and technology. According to the statistics, Hunan Province reported to higher authorities over 4,000 achievements of science and technology, among which over 2,000 were relatively important. It won 27 State Invention Awards, 3 State Natural Science Awards, 46 State Scientific and Technological Progress Awards, and granted 685 provincial outstanding Scientific and Technological Achievement Awards. The percentage of scientific and technological achievements that were to various extents applied to and popularized in production rose from 28 percent in 1979 to 52 in 1984. Very marked economic results were achieved after the popularization of the achievements. Since 1983, the province has popularized about 2,000 new achievements, and developed more than 1,490 new products, of which 1.058 billion yuan of economic results have been taken into our statistics.

The number of Hunan's technological trade service organizations of various kinds have risen to 234. This has enabled Hunan to shorten the average period of the popularization of scientific and technological achievements from 2 years and 3 months at the initial period of the Sixth Five-Year Plan to 1 year and 4 months. It took only a few months to popularize some of the achievements.

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JIANGSU'S 'IMPRESSIVE' S&T ACHIEVEMENTS DETAILED

Tianjin JISHU SHICHANG BAO in Chinese 18 Feb 86 p 1

[Text] During the Sixth Five-Year Plan, Jiangsu achieved numerous scientific and technological results with high economic results and of an advanced level. According to recent statistics prepared by the provincial Science and Technology Committee, the various areas and departments in the province reported and registered 9,507 scientific and technological achievements, of which 5 percent approached or reached international advanced levels, 22 percent were new domestically, and about 50 percent were of advanced level's domestically. Among these achievements, 123 were granted State Invention Awards and Scientific and Technological Progress Awards, and 1,702 were granted awards by the Jiangsu Provincial People's government. Among the applied technological achievements, 85 percent have already gained relatively satisfactory economic results. From 1981-1984, Jiangsu Province developed 806 new products, and established 60 factories, 228 workshops, and 213 production lines. A calculation of the economic results that have already emerged and that can be estimated, reveals that the above new factories, workshops and lines can yield an increase of 1.4 billion yuan in output value, increase the tax payments and profits by 350 million yuan, and earn US$15.46 million of foreign exchange. According to statistics, the 405 projects that have been popularized throughout the province can increase the output value by 940 million yuan.

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TECHNICAL ADVANCES IN JIANGSU LOCAL ECONOMY REPORTED

Beijing REMIN RIBAO in Chinese 18 Jan 86 p 3

[Text] Since 1895, technical personnel in Jiangsu have dedicated their energy to technical developments required in economic construction in order to find new ways to vitalize the local economy and create new experience.

Develop a series of technology to create and develop superiority for local business. Many cities and counties were aiming at developing superiority for industries with local characteristics. Effort was concentrated to develop a series of related technologies, from choosing topics to creating production capabilities. Not only are accomplishments achieved but also products are manufactured and profits are made. The textile system in Jiangsu organized its effort to tackle 471 projects to digest and absorb complete systems based on imported technology and equipment. To date, 300 programs have been completed. Some equipment has already been placed in production to promote technical advances of the entire trade. Silk industry is developed around Suzhou. A series of technical developments from improving the silk producing rate of silkworms, developing new species, renew equipment, to processing after printing and dyeing has been worked on to resolve many technical problems and to advance silk technology. In 1985, the amount of silk exported from Suzhou increased by 13 percent as compared to that for a year before. The export created more than 100 million dollars in foreign exchange.

Comprehensive utilization of favorable resources to adjust the rural industrial structure. In order to meet the urgent demand to specialize, commercialize and modernize the rural economy, many cities and counties began to make changes toward these goals from developing science and technology related to agriculture. They shifted from primarily producing grain, cotton and vegetable oil toward various side businesses in agriculture, forestry, animal husbandry and fishing; from producing basic products to planting, feeding, and processing; and from raising quantity to improving quality, profit and ecological benefit. Projects were planned by focusing on the development and processing of "famous" agricultural products and by-products and comprehensive utilization of ocean, fresh water and mountain area resources in order to convert advantages in resources and technology into products.

Select applicable advanced technology to test, demonstrate and promote to serve small and medium enterprises and township and town enterprises. Many cities and counties used the strategy to "expose the focal points in order to initiate a chain reaction." Limited capital and technical force are concentrated to cover items which will have an overall impact on the total situation. A base for testing, demonstration, training and promotion is created to move technology forward. The comprehensive mountain area development at Fujiachun in Lishui county promoted all kinds of trades in agriculture, forestry, fishing and other part time work. It explored new ways to develop hilly areas in Jiangsu which accounts for 14 percent of the total area in the province. The breakthrough in high quality aquatic products in open water will move fresh water breeding to the open, resulting in the comprehensive and three-dimensional development of 26 million mu of water resources in Jiangsu. During the process of serving small town businesses, many departments created various new experiences. Some provided door to door services to deliver information, data, samples and technology and others provide complete technical services from market survey to product development. Some hold routine news release meetings and others serve as a bridge to continuously lead technology into small businesses.

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TECHNICAL INVESTMENT IN JIANGSU REPORTED

Beijing REMIN RIBAO in Chinese 18 Jan 86 p 3

[Unattributed article: "Experience in the Sixth 5-Year Plan Shows S&T Investment Is Paying off; Every Yuan Invested Results in 28 Yuan of Products and 7 Yuan in Royalty"]

[Text] According to recent statistics released by the Scientific Commission of Jiangsu, a large number of high level, good return technical accomplishments were achieved in the Sixth 5-Year Plan period. Between 1980 and 1984, there were 9,507 technical accomplishments reported. There was one outstanding award, 10 first class awards, 28 second class awards, and 68 third class awards. The provincial government of Jiangsu issued citations to 1,702 items.

The Scientific Commission of Jiangsu performed a statistical analysis on the situation and economic benefits of technical programs carried out in the Sixth 5-Year Plan period. Progress was made in science and technology in that period through the implementation of technical projects. Significant socioeconomic benefits had been obtained. From 1981 to 1984, Jiangsu completed 2,052 technical projects. The completion of these programs resulted in 806 new products, 60 plants, 228 workshops and 213 production lines. Based on calculable economic benefits for items already in production, annual productivity and royalties can be increased by 1.4 billion and 350 million yuan, respectively, corresponding to 28 and 7 times the initial investment. One yuan of investment can generate 28 yuan of products and 7 yuan worth of royalties. In addition, these items earned a total of $15.46 million dollars in foreign currency. Most of these items are being applied.

Based on statistics on 405 items already promoted, the annual increase in productivity reached 940 million yuan. Total increase in productivity due to completion and promotion of technical projects in Jiangsu could reach 2.34 billion yuan per year, which is 2.3 percent of the 1984 GVIAO. It corresponds to 13 percent of the total increase in industrial and agricultural productivity between 1983 and 1984.

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SHANXI'S S&T CONTINGENT DEVELOPMENT REPORTED

Taiyuan SHANXI RIBAO in Chinese 19 Dec 85 p 1

[Article by Liu Chanhai [0491 7022 3189] and Ren Yuanming [0117 2494 6678]: "S&T Contingent Rapidly Developed during 6th 5-Year Plan in Shanxi"]

[Text] During the Sixth 5-Year Plan, the S&T contingent in Shanxi developed very rapidly. To date, there are 224,265 technical personnel in natural science; corresponding to an increase of 46.8 percent as compared to that in 1980. There are 102,652 eningeers, 13,345 agricultural technicians, 44,947 teachers, 57,889 medical technicians and 5,432 researchers. A contingent with socialist awareness and modern technology knowhow has already been formed.

In this team, there are 1,154 senior technical personnel and 31,616 middle level technical personnel. Based on a survey, 20 percent of the junior personnel are working in the capacity of middle to senior level positions with outstanding accomplishments.

In recent years, under the support of the Communist Party and the Government and with the assistance from the people, technical personnel in Shanxi were organized to overcome difficulties. During the Sixth 5-Year Plan, Shanxi won 22 national invention awards and 15 national S&T progress awards. They received nearly 700 S&T accomplishment awards from the Government of Shanxi. There were 47 first class awards, 123 second class awards, 273 third class awards and 240 fourth class awards. These accomplishments have been applied to production and obtained significant socioeconomic benefits.

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NINGXIA SCIENCE, TECHNOLOGY ORGANIZATIONS DISCUSSED

Yinchuan NINGXIA RIBAO in Chinese 16 Nov 85 p 1

[Article by Liu Changming [0491 2490 2494]: "Numerous Scientific and Technical Personnel and Staff and Workers Painstakingly Obtain Many Scientific Research Achievements"]

[Text] Since the 3d Plenary Session of the 11th Central Committee, major developments have taken place in our region's science and technology, reaping many scientific achievements, significantly raising the level of economic benefit and social benefit, and playing an important role in the region's economic construction.

Currently there are a total of 57 scientific research agencies in the entire region, 40 of them being independent scientific research agencies with more than 1700 scientific and technological personnel. Compared with the situation before the 3d Plenary Session of the 11th CPC Central Committee, the number of scientific and technological personnel has more than doubled.

Working hard for the prosperity of the country, the broad masses of scientific and technical personnel as well as staff and workers have worked assiduously in tackling major problems, repeatedly making scientific and technological achievements.

Until now, those topics receiving the award of Autonomous Region First Class Achievement alone number over 600, of which 300 topics have earned the Science and Technology Achievement Award and the Progress In Science and Technology Award promulgated by the People's Government of the Autonomous Region. Nearly 30 scientific and technological topics in the region have received awards from various departments of the State Council, and most recently another three topics earned the national level Progress in Science and Technology Award. Among these scientific and technological achievements, over 20 are inventions, and two received patents in the most recent announcement by the Chinese Patent Bureau, receiving in addition the First National Invention Exhibition award.

These achievements in science and technology have shown that the level of our region's scientific and technological work has risen greatly in terms of being advanced, practical, and economical. In the region there are over 40 scientific and technological achievements which have reached the advanced

level nationally, some of them filling in blanks within the nation. Over 80 percent of the achievements in science and technology have been employed, and popularized, and have brought into play an important effect in the vitalizing of our region's economy. Based on the 1984 statistics on the 46 scientific and technological achievements applied directly to production, their economic benefits reached more than 100,000,000 yuan, 15 of them reaching over 1,000,000 yuan. The successful development of and manufacture by the Ningxia Chemical Research Laboratory of a buffing wheel used for the fluorescent screen interface of a color picture tube, and the placing of it into production to provide parts for Chinese-made television sets, saving a large amount of foreign exchange. The research and application by the Ningxia Nonferrous Metals Research Laboratory of niobium oxide porcelain articles not only increased production of niobium oxide of a high degree of purity but also greatly reduced electrical consumption and contamination by nonmetallic foreign matter, effectively eliminating fluoride. By successfully replacing platinum crucibles with niobium oxide porcelain ones the Ningxia Nonferrous Metals Research Laboratory saved as much as 1,000,000 yuan in funding. The antistatic plastic tubes developed successfully by the Ningxia Light Industry Design Research Laboratory are safe and reliable, can replace metallic tubes used under wells, and fill a gap for our country. The agricultural and forestry research units concerned, the technical institutes and universities, and agricultural technology extension departments in our region put forth a cooperative effort, actively spreading large-area rice cultivation technology, causing average rice production per mu to exceed 1,000 jin. The Ningxia Livestock Veterinarian Research Laboratory achieved success while carrying out intermediate experiments in the production technique of cow circular piroplasmosis cultured cell vaccine, producing the first Chinese antiparasite disease vaccine, the use of which has spread widely in epidemic areas in North China with significant results.

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THEORETICAL MODEL FOR S&T REFORM DISCUSSED

Tianjin KEXUEXUE YU KEXUE JISHU GUANLI [SCIENCE OF SCIENCE AND MANAGEMENT OF S&T] in Chinese No. 2, 1986 pp 15-16

[Article by Hu Shilu [5170 0013 4389], Sichuan Institute for the Study of Science: "Problems Regarding the Theoretical Model for Restructuring the Science and Technology System"]

[Text] Models simulate and describe the true shape of things. The so called theoretical models, also called logical models, through a high degree of abstraction theoretically outline an explanation that has similarities to the forms and structures of things. Restructuring the science and technology structures is a system by which science and technology [S&T] arranges forms of management, the installation of management structures, and the delineation of management authority. What we have called the restructuring of the science and technology system is where we have wanted to restructure and transform structures that are inappropriate to or that impede the development of science and technology, where we have established new structures that can adapt to or promote the development of science and technology. The theoretical model for this restructuring of the science and technology model includes work in these two aspects: one is to produce a theoretical outline of the former science and technology system; the other is to produce a theoretical outline of how we ought to change and what new system for science and technology we should establish.

What is the theoretical model for our former science and technology system? In summary, there are chiefly four points: first, the self-created science research system composed of the so called "Five Front Armies" throughout the entire country, these are the Chinese Academy of Sciences, higher institutions, production departments, the national defense system, and local science research structures. Second, these "front armies" are for the most part highly concentrated under national or local administrative departments, carrying out planning and management according to a vertical model. Third, science research academies and institutes are under a unitary system of ownership by the people. Fourth, they are largely institutions where research expenses are guaranteed by the state and where scientific and technical achievements are transferred to the applying unit without compensation. The defects in this sort of system are chiefly also in four areas: 1. the research system is self-contained, and having broken relations with the economic

system, scientific and technical achievements lack structures through which they are automatically transformed into production, and the economic results are low; 2. lateral relations within scientific research are fragmented, and there is serious dispersion, repetition, and waste; 3. the state has been too protective of research units and govern them too tightly, so that scientific and technical units lack their rightful autonomy, which has repressed initiative and creativity in scientific and technical units; 4. we have neglected the commercial nature of scientific and technical achievements, and we have not been able to recover materially from scientific and technical achievements. These things have all been apparent in a loss of vitality to a great degree in our former science and technology system. This is both unsuited to the requirements of economic development and cannot adapt to the needs of the development of science and technology themselves; this is not only not helpful to the reliance on science and technology in economic construction, but is also not helpful to science and technology as it caters to economic construction.

The new science and technology system that we are to establish should be a system that is helpful to advances in science and technology. Because of this, in light of the defects in our former science and technology system, the fundamental direction for this restructuring should be to powerfully enhance the close integration of science and technology with production, to allow scientific and technical achievements to be rapidly and broadly used in production, to give full play to the decisive function of science and technology in building the national economy, and to promote economic and social development. According to this fundamental direction, the theoretical model for the current restructuring can be summarized and described in the following four sentences: use the energy from a strengthened science and technology system to be the central link in restructuring; make restructuring of the allocation system the starting point; treat acceleration of the commercialization of technical achievements and the opening up of technology markets as targets of restructuring; make the focus of the restructuring the solution of the three problems of expansion of the autonomy of science and technology units, increasing the function of economic levers in the science and technology management system, and enhancing the lateral relations within science and technology.

This energy used to strengthen the science and technology system is what will allow our science and technology system to have an organic life, where its internal cells, organization, and organs are all living, and by which the entire organism can continuously generate things, capabilities, and information exchange, and can undergo a process of metabolism. The energy in the science and technology system should be particularly manifest as beneficial to the improvement of four abilities for this system: to be beneficial in improving the creative capacity of science and technology units, to be beneficial in improving the capacity to transform scientific and technical achievements into production, to be beneficial in improving the capacity to radiate out from regions, and to be beneficial in improving the capacity for absorption of advanced scientific and technical achievements both foreign and domestic.

What we mean by considering the restructuring of the allocation system as the starting point of restructuring is just changing that method from the past in which all research expenses were basically guaranteed by the state to one in which funds are managed categorically according to the characteristics of different scientific and technical activities. Based on the characteristics of different scientific and technical activities in this country, funds management from now on will primarily be in the four forms of a contract system, a fund system, a responsibility system, and a "risk system": that portion of applications research in technology development and from which one can expect results of practical value, a technology contract system will gradually be practiced; for basic research and a portion of applications research, we will progressively try out a science funding system; for those research structures engaging in public service work and that are in the service of science and technology, the state will still allocate expenses and there will be a funds responsibility system; for major research projects where the risk is great, the state should establish a "risk investment fund" and implement a "risk system."

In changing the allocation system, in addition to implementing categorical management of expenses this will also include science and technology allocation from central and local finances, and the rate of growth of expenses for all scientific and technical activities ought, within a short time from now, to be higher than the economic rate of growth of everyday financial revenue or of the gross output value of national production. The flexibility coefficient of science research funds is equal to the rate of growth of science research funds divided by the rate of economic growth. To guarantee that scientific and technical progress will be at the forefront of the building of production, the flexibility coefficient of science research funds should be greater than one, that is, the rate of growth for science research funds should be greater than the rate of growth for the economy. Looking at the situation in Sichuan, in the 10 year period from 1971 through 1981, the average annual rate of growth for science research funds was 4 percent while the average annual rate of growth in the industrial-agricultural output value was 6.9 percent. The flexibility coefficient for science research funds during this period was 0.58 percent, much less than 1. This is a partial reflection that our growth in science research funds is too slow and is not helpful to scientific and technical progress and to science and technology being at the forefront of building production.

What we mean by the commercialization of scientific and technical achievements is that in the process of their circulation and according to the commercial nature of technical achievements, that they consciously rely on and use the laws of value to regulate the relations of exchange and allocation between the inventors and creators of technical achievements. The commercialization of technical achievements can be done through many forms and channels. As, for example, through implementation of a compensated contract system for technology, a technology patent system, and a bidding system.

What we mean by expansion of the autonomy of scientific and technical units is to allow scientific and technical units to become living cells in the entire science and technology organism, and to become relatively independent research entities. Aside from a few research units that must still be directly

subordinate to the leadership of government departments, most should not be subordinate to government departments so that they can face up to the needs of society, the economy, and science and technology developing work on their own. Seeing that scientific and technical labor is a creative complex labor, with greater flexibility than material production, in certain senses research institutes should have more autonomy than do enterprises. When research institutes carry out the institute director responsibility system, the institute director should have the following authority in the institute: in the area of planning, with the prerequisite of guaranteeing completion of tasking in national planning, they would have the authority to select and determine research topics, to take on tasking in all aspects of society, and to disseminate and transfer the rights to research achievements; in the area of scholastic work, and according to the needs of research and the branch of learning, they would have the authority to expand scholastic exchanges and cooperation both domestic and foreign; in the matters of personnel, and in accordance with the requirements of research and set personnel formulations, they would have the authority to determine internal organizational structures, and according to organization procedures, to hire and fire or recommend the hiring or firing of cadre, give notice of vacancies, dismiss personnel, check proficiency, and reward and punish working personnel; in matters of finance, in accordance with national policy resolutions, they would have the authority to arrange for operating expenses and to allocate themselves income created outside of planning. After carrying out the separation of government and research and expansion of autonomy for scientific and technical units, government departments in charge of science and technology will primarily use administrative, economic, and legal means to formulate overall science and technology developmental planning, major science and technology policy, and science and technology laws and regulations. They will also work out directions of a guidance nature for scientific and technical development, organize problem solving for major projects, hire and fire and manage cadre within set limits, and organize international science and technology exchanges and cooperation. Work, this way, is not only beneficial to invigoration on the lower levels, but is also of value for overall control.

What we mean by increasing the function of economic levers in the management system is that we should change the old way of doing things that only used administrative means to manage science and technology, and to add some economic means of management. Aside from changing the allocation system and opening up the technology markets, the nature of these economic means will also be apparent in some science and technology work, especially in technical development and a portion of applications research. Funding and selection of topics will consider technical and economic analyses, research will undergo economic accounting, evaluation and transfer of the rights to achievements will take economic results into consideration, and allocation relations within the institute will be characterized by more pay for more work and rewards for effort and punishment for sloth. In the planning and management system for science and technology, it should be like the economic planning system, which is divided into directive planning, guidance planning, and market regulation, and also should progressively decrease topics in directive planning, increasing projects in guidance planning and market regulation. When directive planning is undertaken, that is primarily for major scientific and technical tasking concerned with the national economy and the people's

livelihood, as well as major topics strongly exploratory or high in risk; for a great number of research topics, national departments that manage science and technology will periodically issue "guides to the development of science and technology" based upon the needs of social, economic, and science and technology development to guide the development of science and technology macroscopically; the majority of science and technology development work will be regulated primarily through the technology markets.

What we mean by strengthening lateral relations has two senses: it includes both the strengthening of internal lateral relations, as well as strengthening the lateral relations between science and technology and production. Only in this way can we conform to the trends in the integral development of science and technology and to the trends toward increasingly closer integration of science and technology with production. The primary measures for strengthening lateral relations within science and technology are: changing the situation in which science and technology is internally fragmented by "front armies"; centering on "wings" organized from many disciplines for integrated tackling of key problems for comprehensive topics; enhancing the close integration of the natural sciences and social sciences, where their planning and management ought to be centralized under national departments in charge of science and technology, and it may even be considered, when the conditions are ripe, that besides putting social science that is purely ideological into propaganda departments, that the existing Chinese Academy of Sciences and the Chinese Academy of Social Sciences could be combined into a unified Chinese Academy of Sciences; for demonstration of major scientific and technical projects, we will not only arrange for the participation of relevant disciplines from the natural sciences, but will also arrange for the participation of relevant disciplines from the social sciences; we will pay close attention to developing comprehensive, overlapping, and intersecting emerging new disciplines, etc. Primary measures to enhance lateral relations between science and technology and production include: encouraging all scientific and technical structures to establish all sorts of cooperation with enterprises and design organizations on the basis of voluntary participation and mutual benefit, some of which could develop into economic entities; some could merge on the basis of that joining, or enterprises could become part of research organizations, or research organizations could become part of enterprises, and some research organizations could develop on their own into research and production type enterprises.

12586
CSO: 4008/2088

ENTERPRISES' LACK OF ENTHUSIASM FOR TECHNOLOGY PURCHASES VIEWED

Tianjin JISHU SHICHANG BAO in Chinese 18 Feb 86 pp 1,2

[Article by Ge Yuehua [5514 1878 5478] and Li Yuming [2621 3768 2494]: "Why are some industrial enterprises not enthusiastic about purchasing new technology"]

[Text] Editor's note: Industrial enterprises are sellers as well as buyers of new technology. In order to make our technology prosperous, we must rouse our industrial enterprises' enthusiasm. The article by Ge Yuehua and Li Yuming raises some important problems related to the development of our technology market. This paper welcomes discussion in this area and hopes that more comrades will enthusiastically contribute their articles on this matter to our newspaper.

At present, there is a prominent problem in the development of our technology market, namely, some industrial enterprises lack interest in the purchase of new technology or the development of new products. As a result, in the technological market in some areas, many technological achievements are waiting for buyers. This has already become a barrier to the deepening of the development of our technology market. If our enterprises' enthusiasm is not roused, it is hard for our technology market to prosper.

Recently, we have made an investigation about this matter and found that there are relatively many factors that affect the enthusiasm of our enterprises. In the main, there are the following three factors: enterprise leaders' lack of understanding of the significance of technology; failure to formulate necessary policies; and the problems related to our scientific research achievements.

Enterprise Leader's Lack of Understanding

To a very great extent, an enterprise lacks enthusiasm about the adoption of technology and development of new products because of the understanding of its leaders. This can be summed up as follows:

-- The idea of turning technological achievements into commodities has not really been fostered in the minds of enterprise leaders. The leaders of some enterprises are still accustomed to getting transference of technology free of

charge and think that spending money to purchase technology is "foolish" and "does not pay."

-- They regard adoption of new technology and development of new products as "expedient measures." Some enterprises consider the adoption of new technology only when their products are unmarketable and they are thus having difficulties. If they can tide over their difficulties, they will stop considering the issue of improving their product technology and substituting a new generation of products for old ones.

-- They lack the strategic idea of long-term development and are satisfied with maintaining the status quo. The leaders of some enterprises are near retirement; therefore, they lack the enthusiasm needed to continue to chart out paths for their undertakings, dare not take risks and are satisfied as long while they are in office the wages, benefits and bonuses for their staff and workers do not decline. Thus, they do not consider the long-term interests of their enterprises.

-- They consider their enterprises to be the best and are blindly complacent. The leaders of some enterprises think that their enterprises have many technological personnel and strong technological forces and that their products are in great demand in the society and enjoy a relatively great market share; therefore, they consider their enterprises to be the best and look down upon the achievements on sale in the technology market. As a result, they develop technology only by relying on the technological forces of their own enterprises and do not utilize the strength of the society.

Failure to formulate necessary policies

-- Many aspects of the current policies are detrimental to rousing enterprises' enthusiasm in pursuing technological progress.

There is a shortage of technology development funds. This is a problem common to most enterprises at present. Many enterprises lack the funds needed for the purchase of new technology. Even if they have developed new products, they lack the funds to renew their equipment and thus cannot acquire the production capacity to produce the products. They have reflected the fact that their rate of retained profit is still very low. After deduction of a 55 percent income tax, and in addition, product tax, business tax, ad valoren tax, readjustment tax, energy and communications tax and so on, there is little left of the profits they worked hard the year round to earn. A portion of the small retained profits has to be transferred to their production, bonus, and benefit funds and used for the apportioned expenses of society; therefore, they do not have much capacity to develop new products or purchase new technology. For example, last year, Tianjin's First Bureau of Light Industry earned 450 billion yuan of profits, but delivered 330 million yuan of it to higher authorities. As a result, the per capita retained profit for many factories under the Bureau was less than 200 yuan, barely enough for maintaining simple reproduction. Some factories each only had several thousand yuan of development funds a year, too small an amount for doing anything major.

-- Taxation issue. At present, the scope of tax exemption for our new products is relatively narrow. Last year, the enterprises in Tianjin applied for tax exemptions amounting to over 100 million yuan, but owing to financial consideration, a little more than 8 million yuan in exemptions was finally approved. This to some extent dampened the enthusiasm of our enterprises in developing new products and applying new technology.

-- There are problems related to the price of new products. When the prices are reasonable, after developing a new product the enterprise will be compensated for the production costs and circulation expenses. Then it will be willing to continue to develop new products. But at present, the differences in prices between new and old products and between products of fine and poor quality have not yet been widened. Some enterprises have been producing the same products for dozens of years, but they are still able to earn a pretty good profit, but others have suffered a reduction in their profits because they have incurred more expense in applying new technology and developing new products. For example, the Tianjin Automobile Industrial Company did research on the manufacture of an "efflux combustion chamber" for automobile engines, which was an advanced product that conserved energy. However, the company failed to put it into production, because the strict technological production process and the increase in costs prevented the prices of the motor engines from being changed. The enterprise received no benefits and lacked enthusiasm in producing the products.

-- The problem of assessing the technological progress of our enterprises. At present, the leading departments of our enterprises mainly assess the performance of our enterprises by their fulfillment of output value and profit targets. This causes our enterprises to be concerned with fulfilling their short-term tasks and does not enable them to spare any resource for the development of new technology and products. For example, the Tianjin Bicycle Factory has been burdened with the heavy task of operating in excess of its production capacity. It dare not spend much time in researching new technology. There are no clear requirements on the factory concerning the application of new technology, the development of new products, the number of new products that have replaced the old ones, or plans and measures related to technological progress. Therefore, the enterprises focus only on the fulfillment of the targets related to output value and profit and do not make efforts toward technological progress.

Problems related to our scientific research achievements themselves

Another important factor that affects the enthusiasm of our enterprises in purchasing new technology and achievements is whether our scientific research units can proceed from the actual needs of our production and develop the achievements that meet market demand.

For a long time, because our scientific research units have been assigned tasks by higher authorities and allocated funds by the state, they seldom have shown concern about our production and economic construction and know little about production reality. Thus, their research achievements are divorced from production requirements, and they are either inapplicable or too expensive for our enterprises. For example, a certain research institute in Tianjin has

carried out quite a few advanced projects, but few of them have been applied in our production. A certain glass factory in Tianjin has relatively backward technology and wants to use the institution's achievements, but none of them meet its demand.

-- The achievements themselves are not perfect. Because some research units lack the necessary testing and measuring facilities, their research achievements are merely "semifinished products" and are still quite a long way away from batch production. Our enterprises do not know the degree of reliability of the achievements and have to exert great effort to continue to perfect the achievements; therefore, they are not willing to purchase technology in our technology market.

-- The achievements are not complete. The application of a new research achievements often requires the solutions to some relevant technological problems. Only when all these problems are solved can this achievement be complete and be able to be put into operation. Our scientific research units often fail to do so. As a result, without the solution of supplementary problems, the enterprises find it difficult to use the achievements. These units are often unwilling to do the supplementary technological work for the technology that they have already sold and think the work troublesome. Therefore, our enterprises are unwilling to purchase the achievements from the scientific research units.

How Can We Rouse the Enthusiasm of our Enterprises

We think that the fundemental reason for our enterprises' lack of enthusiasm in purchasing new technology and developing new products lies in our economic system. Turning technology into commodities is a breakthrough in the restructuring of our scientific and technological system, yet its basis is still the restructuring of the economic system. Because at present we entirely fail to keep the restructuring of our economic system in line with the restructuring of our scientific and technological system, it is still impossible for our enterprises to have a free hand in participating in technological trade activities. At present, our economic structural reform is underway, but it takes time to streamline our administration, decentralize power and enliven our enterprises. Under these circumstances, it is necessary to adopt some measures to give play to our enterprises' initiative in purchasing new technology and developing new products in order to promote their technological progress.

-- We should find diverse ways to raise technology development funds. One year ago, the Tianjin Municipality People's Government issued a document which clearly points out 10 ways to raise funds for developing new technology and products. These are the measures to ensure that our enterprises fully utilize the existing funds of various kinds. For some key development projects, such as the projects included in the plan at and above city-level, within the 3 years after they are put into production, we should allow our enterprises to retain a certain percentage of the newly added pre-tax profits as their technology development funds. We should clarify that a certain percentage of an enterprise is fixed assets depreciation funds should be spent in technological development. In regard to the projects that are carried out by

enterprises' own funds or by loans, we may consider allowing the enterprises to retain the basic depreciation funds of the fixed assets that have been newly put into operation for repayment of the loans and for technology development. We suggest that our banks provide loans at preferential interest rates for enterprises to develop science and technology. Priority should be given to supporting the projects with advanced technology and large economic results and social benefit. A separate account should be opened for the new product development funds as a part of the retained after-tax profits of our enterprises and be specially used for this very purpose. If the enterprises do not spend the funds for the time being, they can lend the funds to other enterprises through our banks to be spent in the new product development of other enterprises.

-- We should continue to support new products. On the basis of the implementation of the regulations related to tax exemption for new products, we should consider widening the range of exemption. At the same time, we should reduce the rate of readjustment tax for the enterprises that have made satisfactory technological progress and earned high profits in order to enable advanced enterprises to have more financial resources for their development of new products. For the enterprises who spend their own special funds in developing new porducts, after the new products are put into production, we should collect only the income tax but exempt readjustment tax for the enterprises, until the total amount of readjustment tax exempted equals the amount of investment. Every year, we should announce a list of products to be eliminated and set a deadline for the cessation of their production. If production is continued, we should impose a larger product tax in order to facilitate the elimination. If a new product outside of the plan is indeed of advanced level and is a real invention, we can give approval for treating it the same as a new product within the plan.

-- We should allow preferential prices for quality new products. We should conscientiously implement the government's policy on fixing prices according to product quality. An enterprise whose products are allowed a price premium because of the fine quality can keep all the income from the price premium. The prices of improved products should be different from the prices before improvement. An enterprise can apply for a price increase on a product for which it incurs more costs because it adopts new technology to improve the quality of the product.

-- We should clarify the substance of the assessment of the technological progress of an enterprise. The departments concerned should draw up assessment criteria and methods as soon as possible, which may include: whether an enterprise has drawn up a plan for its technological progress and for the upgrading and renewing of its products, the ratio of its annual spending in developing new products to its total production funds, the rate of product renewal, the rate of the output value of its new products, the number of products that reach domestic and international advanced levels, and the technological composition of an enterprise. In selecting advanced enterprises, we should regard technological progress as an important condition. We should give certain awards to the enterprise leaders who have comprehensively fulfilled the various targets for technological progress and the technological personnel, staff and workers who have made contributions to tehcnological progress.

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NEW ACCELERATOR TO BOOST NATION'S NUCLEAR PHYSICS RESEARCH

Beijing RENMIN RIBAO (OVERSEAS EDITION) in Chinese 11 May 86 p 1

[Text] Tandem Accelerator To Begin Operations

Beijing, 10 May (XINHUA SHE)--China's first large-scale tanden accelerator nuclear physics laboratory was recently completed at the China Atomic Energy Research Institute and will soon become operational. This is a modern, low-energy nuclear physics laboratory of advanced international standards whose completion signals China's entrance into a new era of nuclear physics research.

The laboratory, which carries a price tag of 50 million yuan, occupies an area of 8,300 square meters. Its tandem accelerator has a peak voltage of 13MeV and was imported from abroad, although most of the auxiliary equipment has been manufactured domestically. The tandem accelerator is one of today's most powerful instruments used in low-energy nuclear physics research. It permits the acceleration of particles of practically all of the elements in the Periodic Table to energy levels of from several tens to over 100 MeV. Using these high-energy accelerated "artillery shells" to bombard atomic nuclei transforms them, producing various light particle nuclear reactions and heavy ion nuclear reactions in order to study the laws governing the action of atomic nuclei. The energy level of this large-scale accelerator can be continuously adjusted and its energy resolving power is high, making it ideally suited for systematic, precise, and concentrated nuclear physics experimental research. It can be used in investigations of such phenomena as light particle nuclear reaction, heavy ion nuclear reaction, nuclear spin, heavy ion fusion, the creation of new elements and the application of nuclear new technologies.

An official of the China Atomic Energy Research Institute told this reporter that they sincerely welcome those working in the same field to make use of this large accelerator for the purpose of elevating China's nuclear physics research to new levels.

/9274
CSO: 4008/60

TRAINING SIMULATOR TECHNOLOGY USED IN CHINA'S ARMED FORCES

Beijing XIANDAIHUA [MODERNIZATION] in Chinese No 2, 1986 p 18

[Article by Xiao Hao [1420 4110]

[Text] Along with the rapid development of electronics, microelectronics, and electro-optic technologies in the 1970's, the developed nations promptly developed training simulators for their armed forces. Computer, microprocessor, and laser-based training simulators mushroomed and found wide uses in weapons training and tactical exercises in the various branches of the armed forces. Experience has proved that such training simulators are highly effective.

Although China's armed forces made a late start in the development of training simulators, they have made rapid progresses in recent years and have reached advanced levels in certain areas. In 1985 China held a military-wide training simulator exhibit and a simulated battle exercise using lasers and electronic equipment. The development of military training simulators in China has advanced from profile and mechanical simulation to computer, laser, and electronic simulation; from technical simulation to tactical simulation; from one branch of the armed forces to the tactical command of an integrated operation; from the simulation of ground battles to the simulation of ground, sea, and air battles of combined arms. A preliminary survey shows that more than 400 training simulators are currently in use or will soon be put into use.

I. Computer-based Simulators

The heart of a computer-based simulator is the computer of the microprocessor. The development of computers has eliminated many of the mechanical devices in an electromechanical simulator. The employment of microchips has greatly aided the miniaturization of simulators.

Weapon training simulators: A computer-based simulator allows the quantification of combat principles, environmental conditions, military force, weaponry, command and control, and efficiency and describes the entire battle process with a simplified mathematical model. Computer-based simulators include weapons training simulators, and more sophisticated simulators for battlefield command, control, communications, information, and electronic warfare. For example, the divisional and regimental commander tactical

training simulator is built on an IBM PC-AT microcomputer using machine language. The hardware includes the main frame, monitor, printer, and the graphic input board. The software consists of a main control program and 13 subroutines on graphics, interference, command, and so on. The system is capable of both man-machine exercises and enemy-home team confrontation simulation to train the personnel. Other computer-based simulators include the division/regiment battle training simulation system, the Fast-Simulate model 1 exponential battle simulation system, the model 82-I ground artillery firing command simulator, and the submarine torpedo attack simulator.

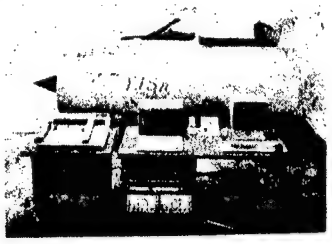

Fig. 1. Jian-7 Take-off, landing simulator

Operator simulators: Operator simulators include ground vehicle driving simulators, aircraft pilot simulator and ship navigation simulator. Computers and microelectronics technologies have continually increased the accuracy and sophistication of simulators. Such simulators can vividly display the movement of vehicles, tanks, and aircraft and simulate 2° of freedom of the simplest ground vehicles or 6° of freedom of aircraft movement. The operator simulators can even simulate the different smells and minute differences in vehicles and aircrafts and thereby greatly reduces the training time and efficiency. Examples are the advanced driving simulator for the model JMG-1 tank, the navigation training simulator for HL-II, the flight simulator for the Qiangji-5, and the portable flight simulator for the Jian-5 fighter.

Maintenance simulator: Computer-based maintenance simulators have been developed for units equipped with advanced tanks, artillery, missiles and aircrafts. The computer may simulate the possible malfunctions, allow the trainee to respond with a repair method, and then judge the correctness of the method. Simulators have been developed for the tracking mechanism of the model BDP-II altazimuth and the electrical maintenance training station.

The wide application of computer based simulators will undoubtedly promote the development of software technology including the standardization of programming and write format and the application of advanced computer languages.

II. Laser Simulators

Since its debut, the laser has found many uses in military training simulation. In the early 1960's, West Germany developed a ruby laser simulator. Today, simulators built on He-Ne lasers and semiconductor lasers are available. In the Chinese armed forces, we have single-soldier laser simulators and lasers and electronic simulation systems for integrated tactical confrontation. The

unique features of laser allowed us to stop relying on the traditional real ammunition target practice and tactical exercises. Laser simulators provide the soldiers with realistic training and allow the various branches of the armed forces to respond quickly to sudden changes in a combined operation. Laser simulators can also train the soldiers for battle command and field maintenance under any terrain conditions.

In the future, we should strive for major breakthroughs. The direction for future developments are: Make the simulation more realistic and effective by using the newly developed electro-optic display, computer imaging, automatic control and microelectronic technology, and 2) serialize, standardize, and modulize the simulators so that they are more compatible in part and as a whole.

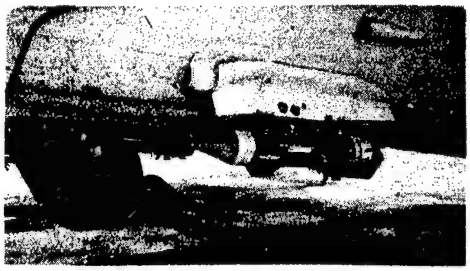

Fig. 2. Laser receiver on Qiang-5 aircraft.

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OPTIMUM NONREDUNDANCY OVERLAY ALGORITHM FOR MULTI-OUTPUT TWO-LEVEL 'AND-OR' NETWORK

Shenyang XIAOXING WEIXING JISUANJI XITONG [MINI-MICRO SYSTEMS] in Chinese No 9, 8 Sep 85 pp 1-7

[Article by He Quanlai [0149 0356 0171] and Xue Hongxi [5641 1347 3356] of Qinghua University]

[Abstract] With advances in intermediate and large-scale integrated circuits, the programmable logic array (PLA) has been extensively applied; PLA is a multi-output two-level "and-or" network nonredundancy overlay. In general situations, the nonredundancy overlay obtained from these algorithms achieves minimization. Even if the minimization is not attained, the outcome is near-minimization in most cases. The authors call it, low-order overlay. One table compares features of algorithms A, B, C, and D. The authors wrote programs for these algorithms in PASCAL and FORTRAN languages. These programs can be executed in computers with small random access memory (28K to 32K).

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HOW TO CONTINUE OPERATIONS WHILE PRINTING OUT FILES

Shenyang XIAOXING WEIXING JISUANJI XITONG [MINI-MICRO SYSTEMS] in Chinese
No 9, 8 Sep 85 pp 15-27

[Article by Feng Huanqing [7458 3562 3237], China University of Science and Technology]

[Abstract] This paper describes how to write a virtual off-line program under the CP/M operating system, so that a user can continue operating the computer while printing files. Programs stated at the conclusion of the paper can be executed on other 8-bit microcomputers supported by other CP/M. One figure shows the distribution of internal memory before and after the virtual off-line program was installed. Three tables show the virtual off-line program, its assembly procedure, and the spool buffer removal program.

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MICROCOMPUTER APPLICATIONS IN SUMMARY OF ACCOUNT TITLES

Shenyang XIAOXING WEIXING JISUANJI XITONG [MINI-MICRO SYSTEMS] in Chinese No 9, 8 Sep 85 pp 43-46, 14

[Article by Ma Hongzhi [7456 3163 1807] and Luo Dongling [7482 0392 0134] of Harbin Institute No 627, Ministry of Aeronautics Industry]

[Abstract] This article mainly presents a microcomputer management system, a mathematical model, the program design approach, and the main functions for account titles. Also described are application features of this management system, developed on an APPLE model II microcomputer using a Chinese character system in Tianlong [4920 4430] coding. According to design requirements, the credit and debit amounts with the balance (and the running subtotal) of various accounting items of the general account can be computed. Consolidation into the corresponding account can be accomplished for the credit and debit amount of the various accounting items, thus producing a chessboard type statement for the current amount. All transactions in number sequence can be included in the printout; this is the format of a journal register serving the function of time sequence general account. A figure shows nine subroutines of the control program.

DESIGNING, IMPLEMENTING MANAGEMENT SYSTEM FOR GRADING CADRE SERVICES

Shenyang XIAOXING WEIXING JISUANJI XITONG [MINI-MICRO SYSTEMS] in Chinese
No 9, 8 Sep 85 pp 52-58, inside cover

[Article by Li Shi [2621 1395], Computer Station, Machinery Manufacturing Plant, Anshan Steel Mill]

[Abstract] This paper presents an application of fuzzy set theory on a microcomputer; the comprehensive evaluation of cadres, and the method and principle of quantitative analysis are introduced. Also introduced are the design and implementation procedure of other functions in the cadre administrative system, as well as some methods adopted for coping with the problems of small memory storage and slow computation speed of the microcomputer in the system's design procedure. The cadre administrative grading system was written in an expanded BASIC language on a made-in-China BCM microcomputer. The printout is in the Chinese language; the grading program began operations in June 1984. Technical certification was granted. Three figures show the system general flowchart, cadre grading program flowchart, and research program flowchart. Some methods in fuzzy set theory have been applied in the cadre grading system. The mathematical methods and programs used in the system can also be applied to other administrative operation if slight modifications are made.

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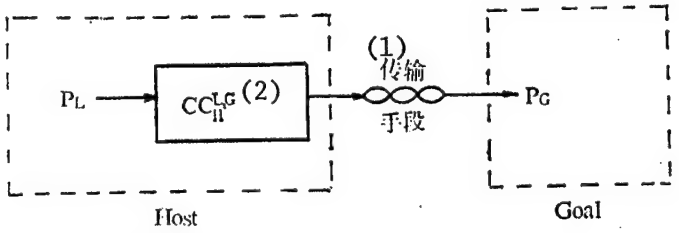
CSO: 4009/1043

MIXED DEVELOPMENT TOOL--CROSS COMPILER

Shenyang XIAOXING WEIXING JISUANJI XITONG [MINI-MICRO SYSTEMS] in Chinese Nos 10-11, 8 Nov 85 pp 112-119

[Article by Yang Shetang [2799 4357 1016] and Lai Xiangfei [6351 5046 7378] of the Shenyang Institute of Computer Technology, Chinese Academy of Sciences]

[Abstract] The paper first discusses how to engage in mixed development and to design an effective algorithm for adequate utilization of the software available for the host computer in order to achieve language cross compilation between the host and goal computers. Then concepts of UNCOL and the design philosophy of pattern matching algorithms are presented for better design efficiency in cross compilation and for enhanced compatibility of system software in the host computer. Finally, the paper introduces a cross development environment with the host system in a Unix configuration and with the C language on an LSI-11/23, and the goal--in Z80 series processors. In addition, cross compilation and code generating routine are detailed. As shown by the authors' practice, cross compilation can serve effectively in solving the software compatibility problem between different computers. The authors develop the following mode between the host and goal computers: L~language [H~G] cross compilation.



Flowchart of Cross Compilation

Key: 1. Means of transmission
2. $CC_H^{L,G}$ indicates L language (cross) compiling of Goal in the Host (CC is cross compiler).

Five other figures show multigoal cross compilation, its transfer, software cross development environment of C language in Unix, code generating program (flowchart) and its mode of cross compilation.

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CSO: 4009/1044

ENERGY LOSS OF RELATIVISTIC ELECTRON BEAM IN MAGNETIZED PLASMA

Chongqing HEJUBIAN YU DENGLIZITI WULI [NUCLEAR FUSION AND PLASMA PHYSICS] in Chinese Vol 6 No 1, 15 Mar 86 pp 1-5

[English abstract of article by Huang Lin [7806 2651] of Southwestern Institute of Physics, Leshan, Sichuan]

[Text] In this paper, the energy loss of a relativistic electron beam (REB) in magnetized plasma has been investigated. We derived the general expression for the energy loss and expanded it in terms of small parameters. Up to the lowest order, the final analytical expression of the energy loss of REB has been obtained. In the absence of an applied magnetic field B_0, it reduces to R.A. Gerwin's result. Finally, we have numerically analyzed the dependence of the energy loss on the parameters. The results show that in some parameter ranges the magnetic field has an important effect on the energy loss of REB.

EQUILIBRIUM AND STABILITY OF TOROIDAL REVERSED FIELD PINCH

Chongqing HEJUBIAN YU DENGLIZITI WULI [NUCLEAR FUSION AND PLASMA PHYSICS] in Chinese Vol 6 No 1, 15 Mar 86 pp 6-10

[English abstract of article by Zhang Peng [1728 7720] of Southwestern Institute of Physics, Leshan, Sichuan]

[Text] An analytical expression of the equilibrium configuration has been derived for the toroidal reversed field pinch. Suydam's condition and the sufficient criteria have been examined. The parameter regions have been determined for which the necessary or sufficient criteria of instability are satisfied. The numerical calculations coincide with the experimental results of HBTX 1 and TPE-1R(M).

ANOMALOUS SLOWING DOWN MECHANISM FOR ION STREAM DURING INJECTION OF HIGH ENERGY NEUTRAL BEAM

Chongqing HEJUBIAN YU DENGLIZITI WULI [NUCLEAR FUSION AND PLASMA PHYSICS] in Chinese Vol 6 No 1, 15 Mar 86 pp 11-16

[English abstract of article by Guo Shuyin [6753 2579 0603] of Southwestern Institute of Physics, Leshan, Sichuan]

[Text] In this paper it is pointed out that there may be an anomalous slowing down mechanism for an ion stream instead of Fokker-Planck diffusion during the injection of a neutral beam when the injection energy is very high.

The slowing down time τ_s for classical and anomalous mechanisms has been obtained. The relationship between τ_s and U_{ib}, the velocity of the ion stream, is quite different for these two mechanisms. The change rates of the kinetic energy $E_{\parallel}$, parallel to the magnetic field B_0, and $E_{\perp}$, perpendicular to B_0, have been calculated.

When the injection direction is nearly perpendicular to B_0, the results show that $dE_{\parallel}/dt > 0$ and $dE_{\perp}/dt < 0$ due to the electromagnetic instability with $K \parallel B_0$ induced by the ion stream.

IMPLODING PLASMA FOR X-RAY LASER RESEARCH

Chongqing HEJUBIAN YU DENGLIZITI WULI [NUCLEAR FUSION AND PLASMA PHYSICS] in Chinese Vol 6 No 1, 15 Mar 86 pp 17-22

[English abstract of article by Yang Zhenhua [2799 7201 5478], Wang Guirong [3769 6311 2837] and Tian Shihong [3944 0013 3163] of the Institute of Applied Physics and Computational Mathematics, Beijing]

[Text] In this paper we discuss the physical process of imploding plasma driven by a high power pulsed generator. It is very difficult to solve the nonlinear kinetic equations describing the plasma. Introducing some simplifications, we have derived a set of analytical formulas. The discrepancy between analytical results and numerically computed results is less than 5 percent. It is shown that the generators with parameters similar to PITHON (power 3-4 TW, output electrical energy 300-400 kJ) could produce high temperature imploding Krypton plasma with a total mass of 200-400 μg, electron temperature higher than 1 keV and density between 10^{20}-10^{21} cm^{-3}. The produced plasma meets the conditions necessary for verifying the theory of neon-like X-ray lasers.

PULSE DISCHARGE CLEANING OF HL-1 TOKAMAK VACUUM VESSEL

Chongqing HEJUBIAN YU DENGLIZITI WULI [NUCLEAR FUSION AND PLASMA PHYSICS] in Chinese Vol 6 No 1, 15 Mar 86 pp 23-26

[English abstract of article by Li Guodong [2621 0948 2767], et al., of Southwestern Institute of Physics, Leshan, Sichuan]

[Text] The HL-1 Tokamak was test-operated on 21 September 1984. During the period of vacuum conditioning, including 60 hours of baking of up to 200°C and 7 x 10^4 shots of pulse discharge cleaning, the calculated quantities of carbon and oxygen removed were equivalent to 24 and 6 monolayers, respectively. Then, 124 shots of Tokamak discharge were performed with low level plasma parameters. The plasma current and pulse length achieved were 60 kA and 85 ms at the toroidal magnetic field of 15 kG. This paper describes the techniques used and the effect on discharge characteristics of bakeout and pulse discharge cleaning of the vacuum vessel.

X-RAY BACKLIGHTING DIAGNOSTICS IN LASER PLASMA RESEARCH

Chongqing HEJUBIAN YU DENGLIZITI WULI [NUCLEAR FUSION AND PLASMA PHYSICS] in Chinese Vol 6 No 1, 15 Mar 86 pp 33-38

[English abstract of article by Lin Zunqi [2651 1415 3825], et al., of Shanghai Institute of Optics and Fine Mechanics, Chinese Academy of Sciences]

[Text] The design of an X-ray backlighting diagnostic system is described, with rules for selecting the main and accessory targets and X-ray filters. Preliminary experimental results are presented. A new technique incorporating a fast-speed streak camera and optical fiber has proven more efficient for time synchronization adjustment among the backlighting beam and the two main laser beams. The discrepancy of time synchronization among the three laser beams was about 10-20 ps.

MEASUREMENT OF SOFT X-RAY FLUCTUATIONS USING VACUUM PHOTOELECTRIC DETECTORS

Chongqing HEJUBIAN YU DENGLIZITI WULI [NUCLEAR FUSION AND PLASMA PHYSICS] in Chinese Vol 6 No 1, 15 Mar 86 pp 39-43

[English abstract of article by Li Linzhong [2621 2651 1813] and Wang Zhengmin [3769 2973 3046] of the Institute of Plasma Physics, Chinese Academy of Sciences, Hefei, Anhui]

[Text] In this paper the principle and structure of vacuum photoelectric detectors (VPD) are described. Results of measurements on soft X-ray (SX) fluctuations using VPD are presented for a Tokamak plasma with $\overline{T}_e$ of 100 eV. The SX signals can be observed when T_{e0} is approximately equal to or greater than 110 eV. The typical sawtooth waveforms of the internal disruptive m = 0, n = 0 mode, the signals of low mode number disturbances and disruptive instability have been observed. Effects of applied helical fields on the disruptive instability have been studied.

THE MANUFACTURE OF COSmθ PROBES AND THEIR APPLICATIONS TO HT-6 TOKAMAK

Chongqing HEJUBIAN YU DENGLIZITI WULI [NUCLEAR FUSION AND PLASMA PHYSICS] in Chinese Vol 6 No 1, 15 Mar 86 pp 44-47

[English abstract of article by Chen Jiayu [7115 0163 7457], et al., of the Institute of Plasma Physics, Chinese Academy of Sciences, Hefei, Anhui]

[Text] In this paper the principles and manufacturing technology are described for the cosmθ type probes (m = 2, 3, 4) used on the HT-6 Tokamak. It is demonstrated that the probes have good characteristics for making Fourier analysis instantaneously. The probes are especially suitable for studying the rapid magnetic fluctuations from the disruptions. Typical oscillograms during the steady and disruptive stages are presented.

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NEW TWO-DIMENSIONAL SCAN METHOD OPERATED BY SCANNING RADIOMETER IN EARTH SYNCHRONOUS ORBIT

Shanghai HONGWAI YANJIU [CHINESE JOURNAL OF INFRARED RESEARCH] in Chinese
Vol 5A No 1, Feb 86 pp 1-6

[Article by Pei Yuntian [5952 0061 1131], Shanghai Institute of Technical Physics, Chinese Academy of Sciences]

[Abstract] Since the spin axis of a satellite is parallel to the earth's axis, the satellite's rotation around its spin axis permits scanning along the east-to-west direction on the earth with a scan radiometer; the stepping motion along the south-to-north direction is accomplished by the radiometer itself. One type of scanning layout is an arrangement in which the telescope as well as the principal mirror, secondary mirror, and folding mirror constitute an entity in a south-to-north (±10°) stepping motion. The satellite rotates around the z axis; and the telescope rotates around the y axis as shown in the following figure:

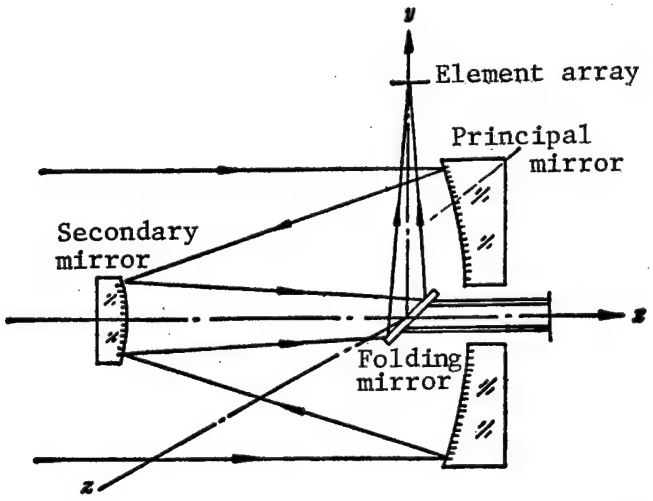

Figure 1. Assembly of Scan Radiometer for Meteosat

The article briefly discusses scanning methods used for the scanning radiometer operating in an earth synchronous orbit. As shown in the figure, a new method (not including a swinging mirror) for this scan is proposed. The accuracy of this scan method is analyzed.

Five other figures show the scan track of scan radiometer for the SMS (synchronous meteorology satellite) and the Meteosat, the stepping assembly with two sets of the scanning system, and feasible locations of radiometer in the telescope assembly in the satellite. The author is grateful to Kuang Dingbo [0562 1353 3134] for his suggestions. The article was received for publication on 25 August 1985.

INFRARED ABSORPTION, RAMAN SCATTERING OF a-SiN_x:H THIN FILMS PREPARED BY GD TECHNIQUES

Shanghai HONGWAI YANJIU [CHINESE JOURNAL OF INFRARED RESEARCH] in Chinese Vol 5A No 1, Feb 86 pp 7-15

[Article by Song Yizhou [1345 0076 0719], Jiang Wendi [1203 2429 1229] and Fang Rongchuan [2455 1369 1557] of Department of Physics, China University of Science and Technology]

[Abstract] Infrared absorption and Raman scattering of a-SiN_x:H thin films prepared by GD (glow-discharge) are investigated. The vibration absorption peaks of NH_4Cl were detected in samples prepared by GD in gas mixture of $SiCl_4+N_2+H_2$. The bonding of a-SiN_x films is discussed. After thermal annealing at different temperatures, a change in infrared absorption due to Si-N_x vibration is observed. Two bonding forms for Si and N may exist in the films; one of them is SiN, and the other is Si_3N_4. Raman scattering of the stretching vibration mode of Si-N bond is also studied. Ten figures show the infrared absorption of a-SiN_x:H thin films; relations between T_S (temperature at the base stratum of the preparation device) on the one hand, as well as C_N (nitrogen content), N/Si and H/Si, on the other; the relation between ν_{Si-H} (Si-H elongation-vibration frequency) and electronegativity sum of substituent atoms, as well as various relations between T_A (annealing temperature) and other parameters; the density of the phonon state of C-Si; and the reduced Raman spectra of a-SiN_x:H, as well as the relative scattering intensities versus x. Two tables list data on the positions of the absorption peak of Si-H key versus T_S, and the scattering peak Γ (of TO) versus T_S. The first draft of the article was received on 16 April 1985; the revised draft was received for publication on 2 October 1985.

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JET CHARGE CROSS SECTION METHOD

Beijing WULI XUEBAO [ACTA PHYSICA SINICA] in Chinese Vol 35 No 2, Feb 86 pp 141-151

[English abstract of article by Tu Dongsheng [2629 2639 3932] of the Institute of High Energy Physics, Chinese Academy of Sciences; Yang Xine [2799 2450 1230] of the Department of Physics, Tianjin University; and Luo Ma [5012 7456] of the Department of Physics, Nankai University, Tianjin]

[Text] We propose a scheme called the Jet Charge Cross Section Method. In this method, the results of calculations in pertubative QCD are not only less affected by the sea quark and gluon distribution functions in hadrons, just like in the calculations of the cross section difference of hadrons ($d\sigma(AB\rightarrow h^{+}X)-d\sigma(AB\rightarrow h^{-}X)$), but are also independent of any fragmentation functions of partons. In addition, it is possible to measure the mean electric charges of various quark jets indirectly without distinguishing the quark flavors.

BIREFRINGENCE IMAGES OF SCREW DISLOCATIONS VIEWED END-ON IN GGG AND YAG CRYSTALS

Beijing WULI XUEBAO [ACTA PHYSICA SINICA], in Chinese Vol 35 No 2, Feb 86 pp 188-195

[English abstract of article by Ge Chuanzhen [5514 0278 3791], et al., of the Institute of Solid State Physics, Nanjing University]

[Text] Birefringence images of screw dislocations in Gadolinium Gallium Garnet (GGG) and Yttrium Aluminum Garnet (YAG) crystals are studied in detail. Birefringence images of screw dislocations viewed end-on were observed for the first time. The one-to-one correspondence between birefringence images of screw dislocations viewed end-on and those viewed from the side was demonstrated. The contour of equal intensity of the birefringence image of screw dislocations viewed end-on in GGG and TAG crystals was derived by considering the photo-elastic anisotropy of garnet, and the results are in good agreement with experimental observations.

INELASTIC NEUTRON SCATTERING STUDY ON ACOUSTICAL ACTIVITY OF $Bi_{12}GeO_{20}$ AND $Bi_{12}SiO_{20}$

Beijing WULI XUEBAO [ACTA PHYSICA SINICA] in Chinese Vol 35 No 2, Feb 86 pp 196-202

[English abstract of article by Tao Fang [7118 2499] and Lin Quan [2651 2123] of the Institute of Physics, Chinese Academy of Sciences; Zhang Taiyong [1728 3141 3057] of the Department of Physics, University of Science and Technology of China, Hefei; Niu Shiwen [3662 0013 2429], et al., of the Institute of Atomic Energy, Chinese Academy of Sciences; and Shi Zhongjian [2457 0112 1017] of the Institute of Acoustics, Chinese Academy of Sciences]

[Text] Acoustical activity of isomorphous crystals $Bi_{12}GeO_{20}$ and $Bi_{12}SiO_{20}$ has been studied by measuring the splitting of degeneracy of transverse acoustical waves propagating along a high symmetric direction with inelastic neutron scattering. One of the interesting results is that the left and right circularly polarized modes of acoustical phonons propagating along the <111> direction are subjected to different attenuations. This conclusion is verified by both kinds of crystals. The experimental results have been observed for the first time in the study of acoustical activity. The lifetime of the phonon with larger attenuation is found to be about 2×10^{-11} s. experimentally.

ELECTRONIC IMPACT EXCITATION CROSS SECTIONS AND RATES. I. SPIN ALLOWED EXCITATION PROCESSES

Beijing WULI XUEBAO [ACTA PHYSICA SINICA] in Chinese Vol 35 No 2, Feb 86 pp 203-212

[English abstract of article by Tian Bogang [3944 0130 0474] and Li Jiaming [2621 1367 2494] of the Institute of Physics, Chinese Academy of Sciences]

[Text] Based on two properties of the generalized oscillator strength densities (1. continuity in an excitation and 2. quasiscaling relation along an isoelectronic sequence), the corresponding parameters in Bethe's formula (namely Bethe's physical parameter set) have similar behaviors. According to Bethe's formula, excitation cross sections for spin allowed processes can be calculated easily in terms of Bethe's physical parameter set which characterizes the excitations of target atoms. In the present article, we introduce corrected functions defined as the ratios between the exact cross sections and Bethe's cross sections. The corrected functions reveal a nice universal scaling feature within 50 percent. Thus, various cross sections as well as rates, which correspond to electron impact excitations from an initial state to infinite final states, forming a so-called "excitation channel," can be obtained conveniently.

TIME-RESOLVED SPECTRA STUDIES OF ArF* AND Ar_2F* EXCIMERS UNDER FAST-DISCHARGE EXCITATION

Beijing WULI XUEBAO [ACTA PHYSICA SINICA] in Chinese Vol 35 No 2, Feb 86 pp 228-234

[English abstract of article by Gu Zhiyu [7357 0037 3768] and Wang Shaoying [3769 4801 5391], et al., of Anhui Institute of Optics and Fine Mechanics, Chinese Academy of Sciences, Hefei]

[Text] The formation and quenching kinetics of ArF* and Ar_2F* have been studied by investigating their time-resolved spectra. Analysis shows that the decay process of ArF* depends on the time evolution of its main precursor Ar*, but that of Ar_2F* is determined by its own effective lifetime. Therefore, the two-body quenching rate constant of Ar* by F_2, three-body quenching rate constant of Ar* by Ar, two-body quenching rate constant of Ar_2F* by He, Ar and F , and the radiative lifetime of Ar_2F* can all be determined.

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SOME COAL-BURNED AFB COMBINED CYCLE AND COGENERATION SCHEMES

Beijing GONGCHENG REWULI XUEBAO [JOURNAL OF ENGINEERING THERMOPHYSICS] in Chinese Vol 6 No 3, Aug 85 pp 218-221

[English abstract of article by Cai Ruixian [5591 4213 6343] of the Institute of Engineering Thermophysics, Chinese Academy of Sciences]

[Text] Some coal-burned atmospheric fluidized bed (AFB) gas-steam turbine combined cycle and cogeneration schemes--AFB afterburned combined cycle, AFB hot water cogen, AFB hot air cogen and AFB steam cogen--are proposed and their thermodynamic analysis and performance is presented. It is shown that these schemes are feasible and valuable when parameters are selected appropriately.

INVISCID-VISCOUS ITERATION TECHNIQUE TO PREDICT AXIAL COMPRESSOR CASCADE FLOW AND PERFORMANCE

Beijing GONGCHENG REWULI XUEBAO [JOURNAL OF ENGINEERING THERMOPHYSICS] in Chinese Vol 6 No 3, Aug 85 pp 226-231

[English abstract of article by Liu Songling [0491 2646 7881] of Northwestern Polytechnic University]

[Text] The inverse mode of the lag-entrainment method is used to predict both separated turbulent boundary layers and wakes, and a new iteration technique suggested by Carter is applied to combine the inverse mode boundary layer calculation with a time marching inviscid flow analysis. It is found that this technique is applicable for obtaining a convergent solution for separated cascade flow. For a high subsonic double-circular-arc axial compressor cascade, the calculated Mach number distributions on the blades, downstream flow angles and total pressure loss coefficients are in good agreement with experimental results in the optimum incidence range. In the design incidence range the agreement between calculated results and experimental ones is not satisfactory.

TIME MARCHING METHOD FOR CALCULATING UNSTEADY FLOW FIELDS AROUND VIBRATING CASCADES

Beijing GONGCHENG REWULI XUEBAO [JOURNAL OF ENGINEERING THERMOPHYSICS] in Chinese Vol 6 No 3, Aug 85 pp 232-237

[English abstract of article by Jiang Zikang [5592 3320 1660], et al., of Qinghua University]

[Text] In this paper stable nonsteady flow fields around vibrating cascades are calculated by use of a time marching method in which vibrating meshes are adopted. In order to reduce the calculating time, the steady flow field derived with a time marching method is used as the initial field, and the calculating mesh is posed to vibrate with the cascade. Time marching is continued until the calculated parameters vary with time periodically with stable amplitudes and phases of vibration. Three calculating examples are presented, and one of them is compared with the experimental values of a similar cascade showing the effectiveness of this calculating method.

CALCULATION OF UNSTEADY AERODYNAMIC FORCE CAUSED BY OSCILLATION OF SUPERSONIC CASCADE

Beijing GONGCHENG REWULI XUEBAO [JOURNAL OF ENGINEERING THERMOPHYSICS] in Chinese Vol 6 No 3, Aug 85 pp 238-244

[English abstract of article by Fan Feida [5400 7236 6671] of Northwestern Polytechnic University]

[Text] A set of equations for calculating the unsteady aerodynamic force of a supersonic plate cascade, whose leading edge and trailing edge are of an arbitrary curve shape, has been developed by means of the singularity method. A program and unsteady aerodynamic work caused by oscillation of a sweepback supersonic plate cascade were provided as an example of its application. This program can provide information to predict the possibility of flutter for the designed supersonic cascade. It is important in guiding the design of the cascade and avoiding unstalled flutter.

STUDY OF HEATING AND EVAPORATION PROCESSES OF SINGLE COAL-WATER SLURRY DROPLET UNDER FORCED CONVECTION

Beijing GONGCHENG REWULI XUEBAO [JOURNAL OF ENGINEERING THERMOPHYSICS] in Chinese Vol 6 No 3, Aug 85 pp 279-283

[English abstract of article by Fu Weibiao [0265 4850 2871] and Li Yinghua [2621 2019 5478] of Qinghua University]

[Text] The heating and evaporation processes of a single coal-water slurry droplet under forced convection have been studied in this paper, and the calculation models have been established. The calculation results are in good agreement with experimental results, so they can be used for estimating heating and evaporation time of a single coal-water slurry in engineering applications.

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